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ABSTRACT

Current thinking on the role of the physical environment in special education is summarized in this report. The material has been synthesized into a "position" that has been developed through widespread contacts with special educators and architects interested in the problem. The paper develops this position in nine topical areas--(1) the concern, (2) exceptionality, (3) learning disabilities, (4) special education, (5) role of environment, (6) environmental variables, (7) environmental conceptualizations, (8) program factors, and (9) directions. The primary attempt has been to underscore the issues and to lay some ground-work for future efforts. [Not available in hard copy due to widespread marginal legibility of original document.] (RK)

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THE ROLE OF THE PHYSICAL ENVIRONMENT IN THE EDUCATION OF CHILDREN WITH LEARNING DISABILITIES

Michael J. Bednar
Assistant Professor of Architecture
Rensselaer Polytechnic Institute

David S. Haviland
Assistant Professor of Architecture
Rensselaer Polytechnic Institute

a position paper developed for Educational Facilities Laboratories by the Center for Architectural Research Rensselaer Polytechnic Institute, Troy, New York

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FOREWORD

Educators now estimate that one of every eight school-age children is "exceptional" -- that is, he is intellectually limited (or superior), disturbed, maladjusted, or suffers from impaired speech, hearing, sight, or physical handicaps. This has always been the case, but recent years have witnessed greater sensitivity to exceptionality, improved screening and detection techniques, and a generally heightened concern for the education of these children.

Then, too, it is very difficult to speak about "these children" -- for no two are alike. All exceptionalities (excepting intellectual superiority) cause "learning disabilities", and every exceptional child possesses a unique set of these disabilities. They may be perceptual, they may be motor, they may be psycho-social, and they may be combinations of these. We do know one thing, though: whatever they are, they cause him problems when he tries to learn. Special education programs attempt to help the child overcome or ameliorate these learning problems and to help him assume his best possible role in society.

Like all children, the child with learning disabilities exists in many "environments" at any one time: a social environment, an emotional environment, an economic environment, a cultural environment. Educators know that each of these is important; in fact, for many children, their home life, their cultural situation and their economic status may have "caused" the exceptionality and the resulting learning disabilities in the first place. Special education programs are, therefore, designed to consider the influences of each of these environments on the child's ability to learn.

What is sometimes overlooked is the fact that yet another environment is also influencing the child as he learns -- the physical environment. While measurement is difficult, most educators and architects hypothesize that physical environment can indeed influence what happens within it -- sometimes negatively and sometimes positively. In dealing with children with learning disabilities, we suggest that the built environment may play an even greater role:

> *Many of these children suffer from perceptual disabilities, and the physical surround plays a large part in everyday perception.*
>
> *Many of these children suffer from motor problems, and the physical surround can help or hinder even the simplest tasks.*
>
> *Many of these children suffer from psychosocial disabilities, and the physical environment is a strong socializing presence -- whether it is conceived that way or not.*

Concern about the role of the physical environment in special education has been increasing in recent years. Special educators are recognizing that they should at least explore the issue when planning new facilities, and they have begun to ask questions. Architects, faced with the problem of committing this planning to bricks and mortar, have also begun to ask questions.

Consequently, Educational Facilities Laboratories posed this question to the staff of the Center for Architectural Research,

> *What is the best current thinking on the role of the physical environment in special education?*

This paper has been developed in response to that question. It does not attempt to develop programming guidance and design studies for these facilities, nor does it attempt to simply provide a list of "who's doing what".

> *This paper attempts to summarize what has happened to date, and to synthesize from all of this a "position" on the role of the physical environment in special education.*

This "position" has been developed through widespread contacts with special educators and architects interested in the problem. Because the authors have assumed the responsibility of synthesis, however, they would be remiss if they did not point out that the "position" is largely theirs as well. There is very little consensus on any issue in this field.

To develop this "position", this paper is divided into four broad areas:

- THE CONCERN is briefly summarized in Part 1. It attempts to put the issues in perspective and to suggest that they do not lie in the sole province of either educator or architect.

- SPECIAL EDUCATION is the focus of the next three parts. This is important because "special children" and "special education" mean many things to many people. Part 2 explores exceptionality in children and Part 3 translates this into the notion of "learning disabilities" -- an approach which is making more sense to educators. At this point, the actual focus of the position paper becomes clear:

  > *We will be considering only those exceptional children with severe learning disabilities who can be educated within the province of public and private schools.*
  >
  > *This includes children who are usually referred to as brain-injured, emotionally-disturbed, mentally-retarded or socially maladjusted. It covers children who are deaf, blind or physically-handicapped only to the extent that they possess learning disabilities.*

  Part 4 discusses the kinds of educational programs developed for these youngsters.

- THE PHYSICAL ENVIRONMENT forms the concern for the next four parts of the paper. The role it can play in special education is considered in Part 5. Part 6 explores the basic building blocks of environment and these are brought together into a series of "conceptualizations" in Part 7.

  > *These environmental "conceptualizations" are central to defining the role of the physical environment in special education. They take the basic environmental variables (light, color, shape, texture and others), and synthesize them into some meaningful statements relevant to special education.*

These conceptualizations are formulated in a primitive way; their translation into environment can only be done with "for instances" -- the supporting research has not been done.

Part 8 ends the concern with physical environment by noting some "program factors" which may arise from local conditions and which must be superimposed on the basic conceptualizations if real buildings are to be constructed.

o DIRECTIONS for future work summarize the state-of-the-art and develop a five-front program for moving forward.

The reader should be reminded that this is a working paper. It is assumed that anyone who reads it is concerned with special education and/or architecture, and he wants some notion of how the two fields come together. The primary attempt has been to underscore the issues, to synthesize a "current position" from them and to lay some groundwork for future efforts. This paper is not intended as a highly-polished discussion of the problem, nor is it a carefully-researched attempt to solve it.

One additional comment. There is a reason that this paper can attempt to be more than a survey of the state-of-the-art: the "Physical Environment and Special Education" project now being conducted by the Council for Exceptional Children, National Education Association. Under the direction of architect Bertram Berenson and the coordination of educator Alan Abeson, that project has done a great deal of work in identifying pertinent literature, surveying existing programs and their accommodations, intensively visiting many "case study" programs, and studying the educator-architect dialogue. While these two men are, at this time, some months away from reporting all of their findings in these areas, they were most helpful in working with the authors of this paper. Their assistance is gratefully acknowledged.

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March 1969

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"Isn't it strange that Princes and Kings
And clowns that caper in sawdust rings
And common folks like you and me
Are builders of Eternity?
To each is given a bag of tools,
A shapeless mass and a book of rules
And each must make ere life is flown
A stumbling block or a stepping stone."

-- Anonymous

1 / INTRODUCTION: THE CONCERN

Exceptional Children and Their Housing

The number of exceptional children receiving special education in the public schools has been increasing at a phenomenal rate. The figure has grown from 378,000 in 1948 to 861,000 in 1958 to 1,520,000 in 1963 to 1,980,000 in 1966 (estimated).[35] This rate of growth is over three times of that for regular education in the same period. Furthermore, the number of school systems providing special education services is also growing rapidly; in 1948, 1500 school systems had special education programs; by 1962 this had grown to 3200. Consequently, the gap between those who need special education and those who have it is closing; in 1948, 1 in 10 who needed it had it, whereas in 1948 the ratio was 1 in 4.[40] The vacuum, however, has not yet been filled.

Not too many years ago, an administrator, when finally convinced that he had to provide some special education for those who disrupted regular classes, would select the storage room in the basement to house it. Today, due to increased awareness of the problem and stronger public and parental pressures, he is forced to remodel some classrooms, add a wing to a school, or even build a special facility to house the special education program. Furthermore, the regional education concept is growing, and a major part of the services of a regional education center may be devoted to special education. In New York State alone 54 of 59 Boards of Cooperative Educational Services operate special education programs; this will probably result in 54 new buildings.

The school superintendents and special educators are today asking the same questions with regard to special education facilities that they were asking about general educational facilities during the big school building boom of the 1950's. What should I build? Will it creatively house my special education program? Will I be able to adapt it to new developments in special education? Should I dare to incorporate innovative ideas?

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* Superscript numbers refer to sources in the Bibliography. (see Appendix)

These questions have only recently been asked. There haven't been many attempts to answer them either verbally or physically. One of the objectives of this paper is to aid the question askers in finding appropriate answers.

The Physical Environment

According to Webster, an environment is "the aggregate of surrounding things, conditions or influences". There are many kinds of environments depending upon the sets of "things, conditions and influences" chosen: political, social, climatic, economic, urban, physical, etc. The physical environment might be also termed the architectural or built environment. It is that set consisting of those things, (building materials, furniture, plumbing, elevators, etc.) and those conditions, (the environmental variables) which make up spaces and buildings for human habitation. The environmental variables are generally considered to be seven in number: space, sound, temperature, color, texture, light, and shape. The sphere of influence created by this particular environment is one of the topics of this paper.

When considering the physical environment, most persons think of a building or a room within it. Its main functions are to keep out the elements, to provide thermal control of the air, and to house furniture and other appurtenances of human habitation. Space is considered as analogous to floor area. Light is a component that permits easy seeing. Now that we have fluorescent light fixtures, it is no longer even necessary for it to come through windows. It is a good environment if it is easy to keep clean and nothing breaks down, especially the air conditioning. Fortunately, the physical environment is much more profound than these simple considerations, but we must become aware of its possibilities in order to exploit it.

The difficulty with studying the environment is that we are all in it. It is like writing history at the same time it happens. The truth of the matter is that our physical environment is so close to us that we oftentimes do not perceive its existence. It is, like culture, what Edward Hall would call "a silent language", one which we all speak subconsciously but do not understand.

Its influence on us is more profound than the influence of our media, as Marshall McLuhan has so articulately pointed out. In fact, he includes it in his list of media; "Housing as shelter is an extension of our bodily heat control mechanisms -- a collective skin or garment".

Churchill recognized its pervasive influence when he stated, "First we shape our buildings and then they shape us". And Pearson stated, "The whole human environment and the whole physical environment educates".

One of the reasons that the role of the physical environment is not too apparent in our lives is our adaptability to it. Everyone has experienced a kind of sensual shock upon encountering a stunning environment for the first time. But upon subsequent visits, the same sensation does not occur. We have adapted or adjusted our senses to that environment. The stimuli are still there, but they have somehow been internalized; they are being perceived but not consciously. We still feel good about sitting in the Piazza San Marco even if it is the hundredth time, but we don't know why. Likewise, we can work effectively in a drab office or carry on a conversation at a cocktail party in a room full of people. To some extent, we can direct our perception, and screen out unwanted stimuli. But, we should hasten to add that there is a price paid in stress; we have fewer headaches (if you will) when the physical environment of our office is suited to our psychological disposition and the tasks we perform there.

Environment and Exceptional Children

In many people who are mentally ill, neurologically handicapped, or psychologically impaired, (this includes many exceptional children), these adaptive mechanisms are impaired or inoperative. Each time they come into a room they see it anew again. They can't find their way around in a building without relying on environmental cues. They can't read when someone else is talking, or eat lunch when there is a window with a view. The environmental stimuli are perceived very directly and consequently produce strong concomitant behavior. Therefore, through consciously manipulating these stimuli we can change these behaviors and/or facilitate the development of the adaptive mechanism. The ability to adapt and to direct perception is a learned trait and falls within the educational spectrum.

The Role of Environment in Special Education

Many educators intuitively think that the physical environment does play a role in education, and possibly even a significant one. To date, however, they have done little to explore this role. The reason for this may not be lack of interest but rather lack of knowledge. Their attitude toward the environment has not been developed. They aren't aware of its relationship to the educational program. They simply do not know how to "get a handle on it". In part, this is due to the newness of the field of environmental science; but efforts are being made to study the relationship between man and environment, and the results of these efforts, as well as future ones, must be brought to bear upon education.

The one-to-one relationship between student and teacher will probably always remain primary in the process of educating exceptional children. The role of the physical environment is to enhance this relationship. "It has been estimated that about 75% of all learning may be accounted for by meaningfulness, motivation and memory, leaving only 25% for the effects of the physical environment alone and in interaction with these variables".[26] We think that there is probably even a smaller percentage that we actually learn from the environment, in the sense of knowledge. Its ascendant role is that of catalytic agent in the learning process. It can create learning situations and foster interpersonal relationships. It can suggest and stimulate behavior. It is necessary but not sufficient for learning.

The Questions

Toward providing a "handle" on the role of the built environment in educating exceptional children, we must ask

- How and to what extent does the physical environment influence the lives of human beings?
- Of what form is the interface between the physical environment and the human organism?
- What is the role of environment in special education?

The Need for Dialogue Between Architects and Educators

> *"The realization by any one profession that the fundamental problems it faces defy solution until they are attacked by several professions working in unison is a strong incentive to cooperative effort. One of the clearest lessons science has taught us in the last half century is that the key to basic problems in any phase of human life is not to be found in one discipline or profession, but in a synthesis of many."*[15]*

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[*] Dr Leonard Mayo, annual report of 1954 as Director of the Association for the Aid of Crippled Children

The need for creative dialogue between the professions of special education and architecture is of the essence of the problem. The chances for building responsive facilities without this dialogue are meager. To foster this dialogue is one of our goals. Certainly, we can introduce the parties and speak of the aspirations of both. But each profession must come "out of its shell" into the open to sincerely participate in collaborative effort. This effort should be conducted in a climate of mutual professional respect with an honest recognition of professional and personal limitations. The collaborative relationship must be mutually interdependent in which each contributes freely of his special skills. Initial attempts at architect-special educator conferences have produced astounding results. But now that the seed has been sown, it must be encouraged to blossom and bear fruit. The "putting together of two heads" is worth the effort.

Neither professional knows what to expect of the other. What kinds of information does he need? What tools does he use? What is his modus operandi? What goals is he trying to achieve with his work? Are there varying schools of thought in his profession, and, if so, which does he represent? Also, semantic difficulties cause misunderstanding. The same words may have different meanings to each. For instance, "specifications" to the educator means educational services and curriculum; to the architect it means that part of the contract documents which describes building processes and materials. The word "design" to the educator means the building facade, but to the architect it is the arrangement of activities in space using building systems.

The Process of Creating Facilities

The process by which an educational facility is developed, from inception through construction, has traditionally taken the following course:

1. MASTER PLAN - an attempt to project needs for educational services and means of providing them on a community basis. Includes survey of existing facilities, financing proposals and site considerations.

2. EDUCATIONAL SPECIFICATION - The philosophical statement including educational approach and curriculum for the school. Includes staff organization and student population.

3. ARCHITECTURAL PROGRAM - The statement of space

needs, environmental criteria, and philosophical approach to the architectural solution.

4. FACILITY DESIGN - Schematic representation in drawings and models of the facility design based on the architectural program.
5. CONTRACT DOCUMENTS - Legal description of the proposed building in drawings and specifications.
6. BIDDING - Securing of construction bids and selection of a contractor.
7. CONSTRUCTION - Actual construction of the facility with supervision of the architect.
8. EVALUATION - Evaluation by architect and client of building performance. Includes any modifications necessary on a continuing basis.

Educator and Architect: Interface vs. Overlap

Usually the interface between architect and educator occurs either between the educational specifications and architectural program or between the architectural program and facility design. To begin the dialogue, the notion of interface must be discarded for one of overlap. The architect must be brought into the process at its inception, and the educator must actively participate through evaluation. The two professions must collaborate in all aspects of the building process.

In developing a master plan, the architect can aid with his knowledge of urban systems, utilities, land use, traffic and conditions of facilities. During educational specifications, his questioning will at least raise some questions about the program's architectural implications. As the translator between philosophy and physical form, the architectural program demands participation by both parties. During the facility design stage, the educator can act as a creative critic. Knowledgeable construction decisions, concerning equipment and costs, can only be reached through architect-client collaboration. Once the building is constructed, the architect's knowledge in furniture and equipment selection, efficient space utilization, and maintenance must be utilized. Also, the in-use evaluation of the building design will help produce better designs in the future.

It is almost universally agreed that there should be an intimate relationship between the educational philosophy and the physical plant. But, how does one build an educational philosophy into a building? There is a lack of an adequate theory to accomplish the translating process. There is a lack of a thorough understanding of the relationship between building and educational program.

Now that the public and administrators have been convinced of the need for special facilities for special education, they should indeed be made special, architecturally. It makes no sense to build a special facility that is just like a regular facility. The magnitude and quality of effort that is being applied to the design of regular schools must now also be applied to the design of special schools. The depth of understanding that architects have acquired of regular educational processes must now also be acquired for special education processes. The social priorities are ripe. The money is becoming available. Only the motivation to persevere is wanting.

The crux of the special education problem can be stated quite generally and simply: to assist in solving the physical, social and psychological problems of exceptional children. Beyond this simple statement though, the problem becomes quite complex. Who are exceptional children? What is the nature of their physical, social and psychological problems? What approaches to the solutions of these problems should we take?

Part 2 will explore the issue of exceptionality: what it is and who are "exceptional" children. Part 3 will isolate the child with "learning disabilities" as the concern for this paper, and discuss the kinds of disabilities most often encountered. Part 4 will then explore approaches to educating these children.

2 / EXCEPTIONALITY

Who Are Exceptional Children?

Exceptional children are those who deviate from the average to an extent requiring special services. "A handicapped child is a child who cannot play, learn, work, or do the things other children of his age can do; or who is hindered in achieving his full physical, mental and social potentialities whether by a disability which is initially mild but potentially handicaping, or by a serious disability involving several areas of function with the probability of life-long impairment."[15] Included under these headings are those children generally referred to by the following terms:

- o gifted
- o mentally retarded
- o orthepedically handicapped
- o speech defective
- o cordiopathic
- o blind
- o partially-sighted
- o deaf
- o hard-of-hearing
- o debilitated
- o brain injured
- o cerebral palsied
- o epileptic
- o hemiplegic
- o emotionally disturbed
- o socially maladjusted

Within each exceptionality there are varying degrees of subnormality. Many times these exceptionalities occur in combination. One exceptionality may cause others to develop. For instance, a crippled child may also become emotionally disturbed and/or socially maladjusted as a result of the reaction to his crippleness.

The Incidence of Exceptionality

It is very difficult to determine the proportion of exceptionality in the population today. The extent of the more discrete exceptionalities such as blindness and deafness is easier to determine than that of the more elusive exceptionalities such as brain injury or social maladjustment. Then, too, there is the problem of whether to count the exceptionalities or the children, since many children possess multiple exceptionalities. Consequently, the statistics on percentage of incidence vary considerably.

Depending on what is counted and how the counting is done, estimates of exceptionality among school-age children range from 8% to 14% of the total population. Figure 2.1 presents one such estimate; since it counts each exceptionality requiring attention in educational programs, it counts some children more than once. As a rule-of-thumb, though, one of every eight school-age children is probably in need of special education.

Areas of Exceptionality	*Percentage*
Intellectually limited	2.3
educable mentally retarded	(2.0)
trainable mentally retarded	(0.3)
Intellectually superior (gifted)	2.0
Disturbed and maladjusted	2.0
emotionally disturbed	
socially maladjusted	
Speech impaired	3.5
Hearing impaired	0.6
hard of hearing	(0.5)
deaf	(0.1)
Visually impaired	0.09
partially seeing	(0.06)
blind	(0.03)
Nonsensory physically impaired	2.0
crippled	(1.0)
chronic health problems	(1.0)

Figure 2.1 ONE ESTIMATE OF EXCEPTIONALITY AMONG SCHOOL-AGE CHILDREN
(Source: *Exceptional Children in the Schools, see reference #12)*

Exceptionality and Education

Exceptionality can be looked at from several viewpoints. The medical professions are interested in the causes or reasons for exceptionality, and have devoted a good deal of effort to isolating them. Society, in general, considers those with exceptionalities as misfits whom it largely ignores. Educators, too, must pay attention to the different kinds and combinations of exceptionalities encountered in school-age children. They must fashion the kinds of programs which will return the exceptional child to the mainstream of society or will at least enable him to take a place in society commensurate with his capabilities.

As our nation develops and its social conscience matures, the obligation to provide equal educational opportunity for all children becomes stronger. We are at the point where each child should be given the kind of specialized education he requires to develop to his full potential.

Attempts at Classifying the Child

Educators know that the type of exceptionality dictates the approach designed to help ameliorate or compensate for it. Consequently, they run head on into the problem of classification, which plagues the field of exceptionality. The single field of mental retardation is so confusing that the American Association on Mental Deficiency has devoted an entire volume to classification and terminology. In looking at the brain-injured child, William Cruickshank asks the question, "What do we call him?" and then proceeds to list the terms most frequently encountered:[10]

Brain-injured child (sometimes with the adjective "minimal")
Brain-damaged child
Minimal neurological handicap
Hyperkinetic child
Hyperactive child
"Organic" child
Child with perceptual disability or the perceptually handicapped child
Dysfunctioning child
Child with special learning problems (often "special" is dropped and the word "specific" is used)
Child with developmental imbalances or developmental insufficiencies
Child with language disorders
Child with cognitive defects

Child with dyslexia
Maturational lag
Minimal brain dysfunction
Neurophysiological immaturity
Central nervous system (CNS) dysfunction
Chronic brain syndrome

The terminology varies from state to state and country to country. In one state, a "mentally retarded educable" child may be "between the ages of six and twelve with an IQ of 50-75"; in another, the age and IQ range for the "same" category may be far different.

Kenneth Bayes suggests a rational end to this confusion by urging the profession to adopt the nomenclature of the World Health Organizations. WHO suggests dividing the group of "mentally subnormal" into two parts; "mentally retarded" when the problem is of socio-cultural origin, and "mentally defective" when the problem has a distinct biological cause. Within these divisions there would be three degrees of subnormality; mild, moderate, and severe.[4] Nevertheless, the forces of habit prevail. The terminology has become too personalized by different parts of the profession. Terminology has been written into legislation throughout the country and it is difficult to change. So the struggle to decide what to call the child continues, while he struggles to try to learn.

3 / LEARNING DISABILITIES

Learning Disabilities as a Criterion for Grouping

Before educators can design programs for exceptional children, they have to establish criteria for grouping them. As suggested in the last part, the problem of classification is a troublesome one. Part of the blame for this situation must go to the medical profession which has been responsible for determining the nature of exceptionality because exceptionality is usually thought of as a pathological condition. These medical classifications were then taken into the classroom. It has only recently been discovered that these medical classifications are probably not the best basis for educational groupings. This is not to say that medical analysis, testing and measurement are not necessary. They are extremely helpful in determining the nature of the child's exceptionality. However, of greater consequence in educational considerations are the behaviors that these children elicit.

Today, special educators are coming to the realization that educational groupings should be based on *learning disabilities* rather than medical classifications. Some cerebral palsied children are quite capable of learning in a normal classroom. Other cerebral palsied children, particularly the spastic type, will behave much like those children termed "brain-injured". Many mentally retarded children function the same as brain injured children. Within each medical classification there exists a whole range of learning disabilities. When we put these children in one classroom and assume homogeneity, we face a problem analagous to having exceptional children in a normal classroom. These children have different educational needs and consequently require different educational approaches.

Relating Exceptionality to Learning Disabilities

So the problem lies with defining learning disabilities and then seeking ways to ameliorate these disabilities. There is no question that all of the exceptionalities cause learning disabilities to some degree. However, with regard to learning, many of these handicaps can be overcome through specialized training.

Referring to the list of exceptionalities developed in Part 2, let us group these children on the basis of learning disabilities:

- The intellectually gifted, although listed here, represent anti-learning disabilities and constitute another special educational problem.
- The orthopedically handicapped, speech defective, cardiopathic, debilitated (special health problems), cerebral palsied, epileptic, and hemiplegic exceptionalities do not cause serious learning disabilities since the perceptual, communicative, psychological and cognitive systems are basically intact.
- The blind, partially seeing, deaf and hard-of-hearing present more serious learning disabilities, since their perceptual and communicative systems are disfunctioning. However, through specialized equipment, instructional aids, and educational consideration many of these children are able to take their place in the regular classroom.
- The exceptionalities of mental retardation, brain injury, social maladjustment and emotional disturbance cause the most serious learning disabilities.

Children With Serious Learning Disabilities: The Concern for This Paper

The most serious learning disabilities are caused by disfunctioning intellectual or psychological systems. This does not include the blind child who may not be able to see but can speak, hear, learn to read and to write. Nor does it include the child who is hard-of-hearing who can be fitted with a hearing aid and placed in the front row. Rather it includes the brain-injured child whose perceptual processes are scrambled and who may not be able to learn at all -- he cannot be "fitted" with a learning device. It includes the emotionally disturbed child (who cannot produce an appropriate response because his image of self is not positive), the socially maladjusted child (who cannot even look at the teacher or sit next to another child), and the mentally retarded child (who simply does not have the intellectual capacity).

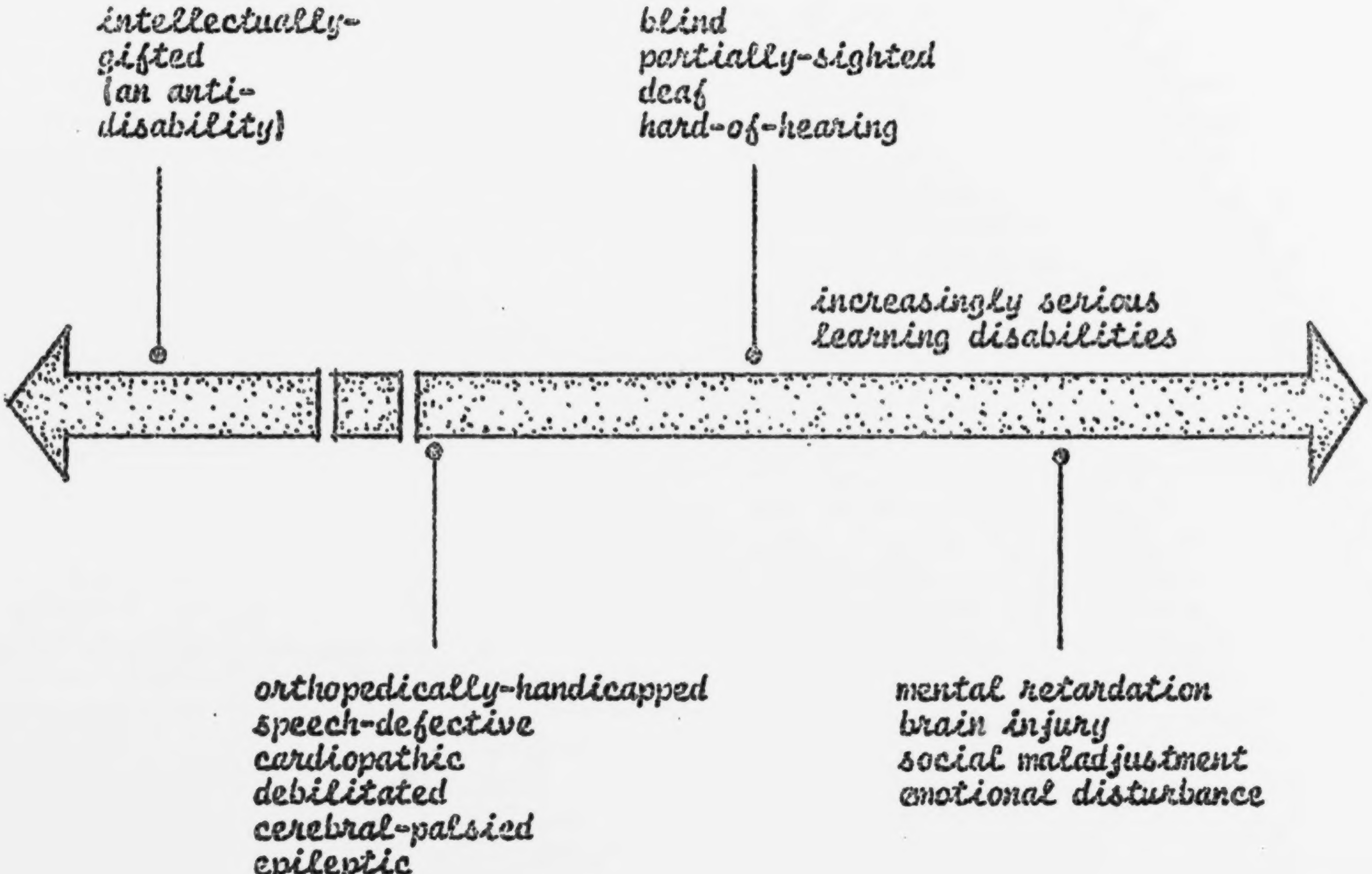
intellectually-gifted (an anti-disability)
blind
partially-sighted
deaf
hard-of-hearing
increasingly serious learning disabilities
orthopedically-handicapped
speech-defective
cardiopathic
debilitated
cerebral-palsied
epileptic
hemiplegic
mental retardation
brain injury
social maladjustment
emotional disturbance

Figure 3.1 RELATING EXCEPTIONALITY TO DEGREE OF LEARNING DISABILITY

It is that group of children who have serious learning disabilities resulting from intellectual or psychological disfunctioning which comprise the real concern of this paper.*

This group includes children from many other groups including epileptics, cerebral palsied, mentally retarded, and emotionally disturbed. All levels of intelligence or I.Q. are present from the gifted to the slow learner. It is a widespread problem occurring in all socioeconomic cultural groups throughout the world. It is, therefore, a common problem to every community. Whether or not it is an actual neurological impairment that causes these disorders has not been conclusively determined. However, some members of the group do have this diagnosis.

The rate of incidence in the school age population is estimated to be as high as 7% with the ratio of boys to girls as high as 25:1.[10] This high ratio may be due to the fact that the cultural environment for girls, high degree of structure with definite limits of behavior, may be the environment necessary to ameliorate learning disabilities. Because of this high ratio, those girls identified at an early age as having learning disabilities are quite seriously disturbed.

The "Brain-Injured" Child: A Portrait

In order to picture a child with serious learning disabilities, a description of a "brain-injured" child developed by Mrs. F. A. Bentzen is reproduced here.[10] It is a composite representing a collection of attributes rather than a description of any particular child.

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* A term which seems to be more and more often applied to this group in general is "brain-injured". It is being advanced by several leading figures in the special education field in an attempt to break down the barriers of existing medical classifications. Dr. James Gallaher gives us this definition of the group: "Children with developmental imbalances ... who reveal a developmental disparity in psychological processes related to education of such a degree (often four years or more) as to require the instructional programming of developmental tasks to the nature and level of the deviant developmental process." 10

"Keeping in mind that no such child or family as that described in the composite exists in reality, some aspects of the composite behavior response pattern which are familiar to parents will be seen as an entirely different behavior pattern to teachers, and vice versa. Psychiatrists, neurologists, and pediatricians will recognize herein some of their most difficult, distracting, and likeable patients. Thus it is entirely possible that if such a child did exist, he might, under various circumstances, be classified as brain-injured, or as one who demonstrates evidence of organicity or minimal brain injury. He might be viewed as emotionally disturbed; as having a home problem; as a psychopathological personality; as having a weak ego or lack of ego integration; as lacking inner controls and requiring a rigid, controlled, and highly structured environment; or as needing an environment which is warmly permissive. He could be regarded as needing immediate long-term residential treatment, or as not being amenable to psychiatric treatment. In some situations such a child might be classified as being a "real boy" whose discipline problems are ones which he will outgrow.

The child is usually a boy. His parents are white, as were their mothers and fathers before them. They may believe in the Catholic, Protestant, or Jewish religion, but do not necessarily attend the church of their faith. The father, a rather quiet man in his late thirties or forties may be a truck driver, nuclear physicist, manager of a chain store, biochemist, or theoretical mathematician, but no matter what his profession, he performs his chosen occupation with outstanding efficiency, dependability, and intelligence. During the week he works long hours, frequently leaving the house before his son is up and returning after he is asleep.

On weekends, if he is not working, he tries very hard to spend some of his time with his son and to find things to do together; but when he succeeds in initiating some joint enterprise, his son for no apparent reason wrecks the afternoon by carelessly thrusting the hammer into the power saw while it is going at high speed, kicking over a bucket of freshly mixed paint, or sticking his finger into a light socket and then exploding into yelling fury when he is jerked to safety. The father, unable to comprehend the violence of the explosion or to control his son's behavior, more often than not retreats to the bastions of his work, remarking to his wife as he does so, that she is too easy on the child, that he needs more discipline.

His wife is an attractive, outgoing, intelligent woman who, up to the time of her son's birth, thoroughly enjoyed her job as a secretary, nurse, teacher, economist, or mother of the two previous children. Before children were born to her, she was active in civic affairs and frequently participated in various types of adult study groups. She enjoys a good fight, although she has learned for the most part to control her aggressive drives in the interest of maintaining harmony in the family and neighborhood.

At this point, her relationships with her son are at an all-time low because he demands constant attention and rebels fiercely when he gets it. He refuses to share his toys with his little sister and knocks her down when she asks to play with his truck collection. He fights with the neighbors' children, except those much younger than himself with whom he spends more time than a boy of his age should. Although he is constantly hungry, especially for sweets, during the family dinner hour -- to which he is customarily a half hour late -- he fiddles with his food until under threat of maternal violence, he gulps it down, frequently eating with his hands instead of the silverware which he throws to the floor upon being reprimanded for bad manners. Although he is an alert, attractive lad, he is failing in school and may have been retained a year, or even excluded from school, because he refused to settle down and get to work.

At their wits' ends, the parents finally take their boy to his pediatrician who more often than not finds him physically healthy, somewhat hyperactive, of normal or superior intelligence and, most comforting of all, a child who will probably "outgrow" his current behavior problems. It is to be noted, however, that during this conference and the many others which follow with teachers, principals, school psychologists, counselors, and therapists, the parents' conversation is apt to have a curiously detached quality, almost as though they were helping the professional to understand the problem of a close friend's child for whom they feel a great deal of warmth and a very deep personal concern but no real responsibility.

The boy established his reputation as a classroom discipline problem between the ages of 6 and 9. He may have had a trial period in a nursery school or a kindergarten group around 5 years of age, but after a very hectic week or so, he was probably sent home as being too immature and not ready for group experience.

In the third grade, if he has not already been excluded from school, he is frequently disruptively aggressive. He talks out of turn, forgetting or neglecting to raise his hand. He appears unable to sit still and is constantly wiggling, fidgeting, twisting, and jouncing up and down in his seat. He runs in the halls, no matter who is watching, nor how often he is reprimanded. His shoelaces, zippers, and buttons, once undone, remain untied, unzippered, and unbuttoned, until standards of decency and orderliness are finally re-established by weary adults. His pockets bulge with miniature trucks, cars, and playing cards with which he plays all day, frequently humming, making odd noises, or talking to himself as he does so.

He is physically attractive, well-built, and appears to have good motor co-ordination. Even though he is frequently awkward and clumsy on the playground and in the classroom, it is assumed that he does not take time to look where he is going.

In the classroom during work periods, he is unable or refuses to follow directions. If pictures, for example, are to be pasted at the top of the page, he pastes his at the bottom and frequently on the wrong side of the paper. If his teacher takes time to give him the directions again, he loses the thread of what she is saying before she has finished the first sentence. If he manages to complete any work at all, it is indescribably sloppy and carelessly executed. He agrees with everything the teacher says and on occasion treats her with great respect. The next minute he denies he took from her desk the pencil which is sticking out of his pocket. His books are torn and dirty.

He shrieks and cries like a frightened two-year-old if he cuts his finger. However, when the basketball lands on the roof of the school, he climbs the side of the building (with no visible means of support), retrieves the ball, which he refuses to throw to the waiting players, and shinnys down the drain pipe, kicking at someone's head as he jumps the last five feet to the ground.

No matter what he scores in terms of a functioning IQ (intelligence quotient), the school psychologist reports that the test results are characterized by an unusual spread. He fails, for example, in some tasks at a level four years below his chronological age. In general, his greatest strengths are in the verbal concepts and greatest weaknesses in the performance level. The examiner frequently concludes his report with a statement that he does not feel the final score is a valid estimate of the child's potential.

The boy may not be able to read at all, and he may test at the same readiness level for three consecutive years. Or he may read with great fluency two years above his chronological age, but be so lacking in comprehension that, if he is asked to repeat the story in his own words, he will be unable to think of a single thing to say that is relevant.

He is somewhat better at arithmetic; but his worksheets, which he twists about or turns at an odd angle as he works, are usually in shreds by the time he should have completed the assignment. His spelling and handwriting, if they are at all comprehensible, are atrociously inaccurate and carelessly executed. In his everyday speech, as well as in his reading, writing, spelling, and arithmetic papers, one notes reversals, substitutions, and omissions of words. He dislikes art class, refuses to participate in finger painting, and frequently loathes clay, which he throws at the other students. He likes fans, motors, small trucks, and pets which he mistreats.

He rarely has friends, although he frequently has accomplices both at home and at school. In playground activities, he is something of a bully. He refuses to participate in organized group games, but then harries his classmates from the sidelines. He appears to be completely devoid of even a rudimentary sense of fair play or of the existence of rules. In general, he gets along better with adults than with children. Adults are often attracted by his graceful charm, but are apt to have the feeling that they are unable to reach him.

On occasions he explodes into temper tantrums or apparently unprovoked rage reactions of such violence

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that he may constitute a danger to himself or others. At times it appears that his only regret after such episodes is that he did not kill or demolish the offending object.

He loves ritual, marching, and making up elaborate rules. He would give his immortal soul to be a member of the school patrols, but even if he is able to read and understand the patrol pledge, he forgets it two days later, as he does the rules and regulations. He loses his patrol badge, coat, belt, and hat, and has a difficult time giving directions at the intersection because he apparently does not remember the difference between left and right.

And finally, in the neighborhood he may be, or he may only be suspected of being, a thief, a fire setter, or both. On the other hand, he may be the idol of the neighborhood mothers and his teachers, because in both deportment and dress he is always the perfect gentleman. But no matter how he appears to others, after the long day's frustrations and failure to get along with others, at night he wants closeness and warmth more than almost anything else in the world, even when he twists his body sharply out of the very arms which would give him what he needs and wants most."

With this general portrait of a child with serious learning disabilities in mind, let's take a longer look at the disabilities themselves: what they are, what may cause them, and the kinds of behavior associated with them.*

The Causes of Disabilities

The causes of learning disabilities are many and vary with the child. In some children it may be the result of a genetic trait. In others it could be due to injury during the prenatal period or during birth. Sometimes it is the result of injury or illness during childhood which affects the brain. Disabilities are probably encouraged during early relationships with the parents and the lack of healthy social and emotional reactions from them. The child tries to learn and fails and the parents withhold reward responses which, in turn, discourage the child from further attempts. Other learning disabilities are attributed to the environment in which the child grows, whether it be a slum or broken home. However, the disabilities of most of these children cannot be attributed entirely to environmental circumstances or neurological handicaps but rather to the interplay between these two aspects.

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* The remainder of this Part is in good measure based on Chapter II of *The Brain-Injured Child in Home, School and Community* by William M. Cruickshank.[1]

The Problem of Identification

Identifying specific learning disabilities in any one child is, with the present state-of-the-art, a difficult undertaking. There are many tests and examinations which contribute to overall diagnosis and educational evaluation. Among these are the family history questionnaire, pediatric examination, neurological examination, clinical psychological examination, speech and hearing examination, opthalmological examination, and pediatric psychiatric examination. It is difficult to identify the specific learning disabilities which are obtained from these examinations, because each is in part attributable to the make-up of the entire child. Learning disabilities appear in the child in different combinations and in many degrees of severity; no one child has all of the disabilities listed below nor is any normal child ever free from any one of them at some time in his life.

Generally, learning disabilities can be classified by identifying them as PERCEPTUAL, MOTOR and PSYCHO-SOCIAL disabilities.

PERCEPTUAL LEARNING DISABILITIES

Perception is man's means of achieving contact with his environment and obtaining information from it. It develops with motivation and learning. It is composed of two aspects: the actual sensual stimulus reception and the preparatory set or readiness to receive that stimulus. The former is dependent upon how well each person's senses function mechanically; The latter is an accumulation of all of our past experiences at perceiving and determines the unique manner in which each individual "see things". Improvement in perception, or perceptual learning, is a matter of being able to screen the stimuli and select those which are meaningful at any one time.

Perception also includes the way in which we process the information which we perceive: how well and in what form is it stored in the memory? how easily and how thoroughly can it be recalled? Another concern is how well the senses are integrated into an effective working unit, so that total sensory impressions can be obtained: does the eye see what the ear hears? If the perceptual or sensory mechanism is in good working order the problem then comes from the organization of perception. This is, in fact, the area in which most learning disabilities lie.

Sensory Hyperactivity

Sensory Hyperactivity is an inability to control or direct the senses, resulting in responses to irrelevant stimuli. It is one of the most significant barriers to good adjustment and successful learning. The sensory-hyperactive child responds to any and/or all stimuli within his perceptual field whether they are related to his present task or not. Consequently, he easily forgets what he is doing; he is easily distracted. The stimuli which distract can involve any of the five senses and be internal as well as external. Thus, a dropped pencil, a dirty spot on his desk, his heart beat, the teacher's red skirt, rustling of the drapes, movement of the child next to him, a cloud in the sky outside, whispering in the back of the room, footsteps in the hall, and many other stimuli may cause long chains of stimulations which take him away from his task. The list of sensory stimuli in any environment at any time is very long. Most people can ignore most of these stimuli and focus their attention on those which are essential to what they are doing at the moment; the child with this disability cannot.

Reduction in Attention Span

The resultant of this hyperactivity is a reduced attention span. Learning can only take place during periods of attending. The teacher and parent can only reach the child when he is listening. When a teacher sets aside thirty minutes in her lesson plan for an activity, and the child can only be attentive for five of those minutes, a large portion of his time is spent unproductively disrupting the rest of the class. He is constantly admonished to pay attention. It is not his fault. The lesson plan must be shaped to suit this child, so a successful experience is achieved and the attention span gradually lengthened.

Short Memory and Poor Recall

Closely associated with attention span and sensory hyperactivity are problems with memory. Short memory and poor recall are common characteristics of children with learning disabilities. This stems from the fact that during periods of stress, memory and recall systems break down. When trying to remember a stressful incident such as an automobile accident, many persons "draw a complete blank". When confronted by a group of listeners, many persons experience "stage fright", and lose their memory. Since many of these children are under constant emotional and psychological tension while trying to operate in stressful situations, their memory recall systems do not function optimally.

Perseveration

Perseveration is the inability to shift easily from one mental activity to another. In children with learning disabilities it may manifest itself as the "prolonged aftereffect of a stimulus on subsequent activities in which the child may be engaged".[10] When asked to copy a word, this child may continue to repeat writing only the first letter. He is so involved with the stimulus of the first letter that his mind cannot move on to the others. This child often repeats the same sentence or phrase over and over again. He continues to laugh long after the joke is over. He continues to play catch after the game is over. In all these instances, the activity or mental state has been perpetuated or perseverated. Adults often experience this in the inability to stop humming a novel melody.

Dissociation

Dissociation is the inability to see things as a meaningful whole. The child cannot perceive a Gestalt or conceptualize separate things into a meaningful unity; to "see the forest for the trees". When he tries to write, he cannot put lines together to make letters, letters together to make words, or words together to make sentences. It is a serious disability which influences many of the child's activities.

Figure-Background Reversal

Figure-Background Reversal is another serious perceptual learning disability. It involves a reversal of the visual field such that the background stimuli take precedence over the foreground stimuli instead of vice versa. In other words, the child cannot focus his attention on the word he is reading, but rather he sees all the other words on the page. He cannot perceive distance to an object because the background against which it is placed is clearer to him than the object. Consequently, he cannot perceive three dimensional relationships. Oftentimes he must touch the teacher to help distinguish her from the background against which she stands, to help him form a visual impression of her. Many adults may have experienced this disability -- albeit in lesser form -- in not being able to see the snake in the forest or the rabbit in the bushes.

MOTOR-RELATED LEARNING DISABILITIES

A child with motor-related learning disabilities may have problems of two kinds: motor hyperactivity or poor motor skills.

Motor Hyperactivity

Motor Hyperactivity is the counterpart of sensory hyperactivity and is defined similarly as the inadvertant reaction to all stimuli which produce a motor response. It is often referred to as motor disinhibition or hyperkinetic behavior. This child will touch, knock over, break, pull, or push anything and everything within his visual field. He is constantly ready to explode into an outburst of running, jumping, yelling, kicking, hitting, and squirming. He is constantly on the go and never appears relaxed or at ease. In school, these children are considered discipline or management problems. They are not capable of learning fine motor skills such as writing, nor can they engage in quiet activities such as story listening. Each motor activity stimulates further activity of greater intensity until there is a crisis in the classroom. Many children are hyperactive, but the degree of hyperactivity of these children goes far beyond the level of social tolerance.

Poor Motor Skills

Many of these children have poor motor skills which are probably, to some degree, the result of brain injury. Fine as well as gross motor movements may be affected but not to the extent of the spastic behavior associated with cerebral palsy. This child is termed "clumsy" and "uncoordinated". He cannot button his coat, use his fork to pick up food, or walk up steps without tripping. His handwriting is unrecognizable. He functions in a motor sense as a much younger child, as many as four years younger than his chronological age.

The child with poor motor skills has little understanding of the orientation of his body in space. He cannot tell his right foot from his left, although he knows the terms. He has no notion of direction; forward or backward, left or right, up or down. It is currently suspected that understanding mathematical concepts is related to understanding of spatial relationships and spatial position. It is no wonder that this child does not do well in mathematics.

PSYCHO-SOCIAL LEARNING DISABILITIES

Psycho-social learning disabilities are in good part the resultants of the other learning disabilities. They are caused by unhealthy relationships with family, peers, and society. As such, they can be greatly mitigated through sympathetic understanding.

Poor Concept of Self

The child with learning disabilities by and large does not have a healthy self-concept. His ego structure is not commensurate with his age. From infancy, it has been communicated to him that he does not do as well as he should, or as well as other children do in everything from eating and toilet-training to writing and playing ball. The old adage that "you are what you think you are" carries a good deal of truth in these situations. These children are failures because they have been called failures; they are under-achievers, because they have heard teachers say they are.

Another old adage might be repeated for its relevance to this problem, "Success breeds success." The brain-injured child has often failed in performing at the level of expectation and the reward of success has been withheld from him many times. Contrast this with a normal child. He has confidence in himself and is not afraid to undertake new challenges, because he has been successful in the past. From the beginning, rewards of praise, love, candy, toys, have been showered upon him for good performance. The successes have fostered the development of an ever-enlarging ego and self-concept. This child sees himself as one who can achieve, and he does. He is well adjusted emotionally and psychologically.

Distorted Body-Image

Associated with the development of ego and self-concept is the notion of body-image. Normal children have confidence in their bodies and take pride in them. Their muscles are coordinated such that their body operates as a unit. Furthermore, they know what to expect of their body and how to control it so that it performs as required by the situation. Out of this positive body-image comes a positive self-concept.

The child with learning disabilities may have a distorted body-image. He doesn't know the location of the parts of his body. When he wants to run, he stumbles. His fingers will not do what he wants them to do. He is constantly bumping into things and knocking them over. People call him a "spastic" and make fun of his clumsiness. These children have little concept of what the human form is like or how it operates. Their bodies are hindrances to them rather than aids. From a psychological viewpoint, this body-image results in an immature self-concept, which is one of the factors keeping him from successful learning.

Aggrevation by Social Pressure

Social pressures are another important factor which prolong rather than ameliorate psychological learning disabilities. The demands of normal society to perform cannot be met by this child. He begins to hate himself. Those who try to help, -- parents, teachers, relatives, older siblings, -- often hinder because they don't understand. Other children call him names and make fun of him. He is blamed for spoiling family fun. As a natural reaction to protect what little ego he has, he develops defenses. The child begins to withddaw from society; he becomes aggressive; he displays violent emotion. A person must establish his personal identity or self-concept before it can be extended into society. The infant develops this self-concept within the protected surroundings of his family before becoming exposed to society. The brain-injured child, whose self-concept did not develop during the infant stage, is not prepared to assume his role in society.

In Summary

What must be remembered is that a child functions as a coherent system. The learning disabilities described above do not exist in isolation. They affect the whole child. Each disability is both cause and effect for other disabilities. Perceptual learning disabilities are the causes of many psycho-social learning disabilities. The child who cannot read well because of dissociation loses a degree of positive self-concept each time the teacher asks him to read aloud in class. Motor related learning disabilities certainly affect, if not cause, perceptual learning disabilities and vice versa. The child who has no body-image does not understand the human form and has difficulty in seeing the teacher against the blackboard (figure-background disability). Psychological learning disabilities may even be the causes of the others. The child is not motivated to improve his perception because his self-concept has been deflated through repeated insults from his peers. The concept of learning disabilities as a total syndrome should never be put out of mind.

This is not to say that each child has all of the learning disabilities. The combination of learning disabilities and the degree of disability is unique to each child. The sometimes-believed notion that each disability is unrelated to the others, and can be individually treated, is not a valid one.

4 / SPECIAL EDUCATION

The Goals of Special Education

When one looks at the kinds of learning disabilities that are often manifested in children, he can begin to see what is "special" about special education. Not only is a maturing national conscience placing special education in the spotlight, the number of children who are identified as requiring it is growing at a rapid rate. As suggested before, this does not relate so much to the incidence of exceptionality (which is thought to be rather constant), as it does to the improvements in technique for screening children and actually identifying the causes of their learning problems. This is particularly apparent when one looks at the more elusive exceptionalities: retardation, disturbance, maladjustment, brain injury. For many years children with these exceptionalities were simply passed off as "problem children"; now their problem is being pinpointed and special education opportunities are being developed for them.

The goal of all special education is to return the child to the "mainstream" of society, to ameliorate or help him overcome his particular set of disabilities. Quite obviously, this is not always a feasible goal. There are children with such severe disabilities that they will never be able to assume even a sheltered role within society. In these cases, it is the goal of special education to develop their existing capacities to the fullest possible extent.

The Range of Programs

Because the range and severity of learning disabilities is so broad, a full spectrum of special education programs is now evolving. There are institutional homes for long-term placement of those with the most severe and permanent exceptionalities. Within the context of public and private elementary and secondary education, there may be,

- Special schools for special education. These schools may serve any number of types of exceptional children, and are usually designed to allow maximum flexibility of student grouping and maximum "support" for the program. Some private schools are residential, but many of them (along with nearly all public schools) provide daytime educational programs with the child returning home at night.

- Special education classes may be set up as part of an existing school or separately placed in another location. The usual approach here is to provide special education and learning opportunities without removing the child too far from his home area. When classes like this are provided, the objective of returning the child to "regular" classes in his home school is usually a very compelling one.
- Supplementary instruction may be provided as part of regular school instruction for students with physical, speech, hearing or visual defects or impairments. The objective here is to keep the child with his non-impaired peers, thus reducing the possibility of his acquiring psycho-social learning disabilities as a result of his impairment.
- Temporary special education situations may be incorporated into regular school programs. These are often developed as a result of very sophisticated screening methods which suggest the mere presence of an exceptionality which might, if allowed to flourish, result in a more serious learning disability. The obvious goal here is to only minimally remove the child from his regular milieu.
- Analogous to the last situation is that where children identified as having minor learning disabilities are placed in regular classrooms. The key to this situation is the teacher's knowledge of the disability and some insight into how to handle it.

The Program as a Response

No matter how it is set up and operated, any type of special education program is a RESPONSE -- a response to particular combinations of learning disabilities in particular children. This is true not only of the school but of the classroom. No matter what particular approach is used in that room, one can be sure that it is a UNIQUE RESPONSE to the unique combination of disabilities among the children in that room.

This last point is one which seems quite obvious to educators when they are talking among themselves; but it is also one which often fails to get communicated to the architect. It is the teacher in the classroom who sees how very different his children are; because the architect looks at the school or program as a whole, these differences begin to fade, and the notion that there is "one approach" begins to emerge.

Approaches to Special Education

With this caveat in mind, it is possible to look at some of the "approaches" (general directions rather than specific techniques) that are often taken in special education.

The very fact that there are different approaches is worthy of note. There is very little consensus in the field. The problem begins with the confusion of categories and names for the children (as noted in Parts 2 and 3) and continues into the areas of diagnosis and program development. Perhaps it is just as well that one approach has not become dogmatic, for it allows the individual educator a great deal of flexibility in shaping his approach to fit the needs of his students.

There are "pure" approaches but they are seldom seen in practice. The actual classroom approach is a conglomeration of theory, experience and sometimes intuition. Because the teacher usually deals with a very limited number of students, he can pick and choose from his"grab-bag"of theory and experience and attempt to fit his approach to the individual. As classroom dynamics evolve, as the teacher learns more about the students, and as he interacts with other teachers and theoreticians in the field, he modifies (and hopefully improves) his way of doing things.

Three different approaches have been selected for brief exposition here. They hardly represent any consensus, and of course there are many modifications and compromises among them in practice. They have, however, been rather explicitly stated in the literature of special education.

The Role of Diagnosis and Evaluation

Each of the three approaches, however, has at least one common element: the importance of diagnosing the child's learning disabilities. Each approach assumes that the disabilities have been identified; from there it attempts to develop a program which will ameliorate or overcome them. Diagnosis, therefore, is an integral part of any special education program. By the same token, continuous educational evaluation of the child's progress in meeting the disability is also important. This not only assists the educator in reformulating goals for each child, but will also help ascertain readiness to move out of special education programs (or into another program). No matter who actually develops this kind of data, it is the teacher who ultimately uses it most effectively, and he must be a part of the diagnosis-evaluation team.

DEVELOPMENTAL APPROACH

In a reference made in the last part of this paper, Dr. James Gallagher characterized brain-injured children as having "developmental imbalances". This is an apt description, and underlies one approach to special education.

Children develop in a series of phases. The exact time at which the developmental abilities associated with each phase actually emerge is a product of two factors: individual differences and cultural variety. The sequence of development, however, is independent of both; children proceed from the sensory-motor phase to the language phase to the perceptual phase and finally to the higher cognitive processes phase. Emotional and social development runs through all phases.[16]

Those who espouse a developmental approach to special education say that difficulty at any phase in development may be due to insufficient development in a previous phase. In other words, the child is not "ready" to assume tasks in one phase until he has successfully completed the previous one; a child cannot learn to read until certain fine motor movements of the eyes are developed. This concept of "readiness" is basic to the developmental approach.

When learning disabilities are diagnosed, this approach looks for "developmental imbalances" and attempts to prescribe a program which will bring the child to readiness. If diagnosis shows that a learner is lagging in perceptual development, for example, his program would be devised so he could go back and do further work in the earlier phases of perceptual development.

This "going back" applies only to the child's actual diagnosed imbalances; academic work at his school age level is maintained as much as possible in order to keep him with his social peer group. To accomplish this, methods of teaching academic material, while compensating for developmental lag, have been developed. Language training, for example, can take place coincidentally with reading lessons; mathematics can be studied using concrete objects of different shapes and colors, improving manipulatory skills in the process.

Corresponding to the general stages of development, there are four basic areas of developmental remediations:[16]

- SENSORY-MOTOR TRAINING. This involves all aspects of physical education, including fine motor movements and manipulatory skills. Of particular importance is development of body-image, directionality, and spatial awareness.
- AUDITORY AND VISUAL PERCEPTION TRAINING. Perception plays a significant role in all learning activities, and in early school years there is a high correlation between perceptual difficulty and emotional difficulty resulting from the strain of perceiving.
- LANGUAGE AND COGNITIVE TRAINING. Language is, of course, the basic human communicative tool. Cognitive processes involve abilities to abstract and manipulate concepts within the mind.
- EMOTIONAL AND SOCIAL EDUCATION. This is a continuing process involving the whole child, rather than any specific developmental difficulty. Emotions are the mortar which binds a personality, and positive and significant social relationships are the most potent cure for emotional ills.

PSYCHOTHERAPEUTIC APPROACH

The psychotherapeutic approach stresses the reintegration of personality and the establishment of stable interpersonal relationships. The educational process is used as a therapeutic tool.

Psychologists and psychiatrists are the directors of the educational program. Following their tests and interviews, a comprehensive program of therapy and counseling is prescribed for each child. The child receives psychotherapeutic assistance on a regular basis from a person who counsels him and aids him to understand his problems. The attempt is to bring balance to the child's life, to make him a confident and secure person who knows himself. A social worker aids him in his family situation, in being understood and accepted by parents and siblings.

The psychotherapeutic classroom is quite distinct from other classrooms. The teacher acts as a model of behavior which the child trys to emulate. The teacher also strives to enter into an interpersonal relationship with each child to uphold his ego and satisfy his insatiable need for love. The classroom environment is structured to encourage play therapy but to discourage the chaos that is the result of too much permissiveness. Failures are ignored and successes rewarded -- first with concrete rewards and later with verbal praise. The children are encouraged to bring into consciousness unconscious repressions and to express themselves in their play. Activities are structured to develop positive social relationships with the other children. The child learns to enjoy other children and their company. This therapeutic classroom setting seeks to reduce emotional disturbances and thus eliminate learning disabilities, since the two often stem from each other.

BEHAVIOR MODIFICATION APPROACH

The behavior modification approach is concerned with ameliorating maladaptive behavior and replacing it with more adjustive behavior. It is more concerned with the effects of exceptionalities (that is, the child's behavior) than actual causes of the exceptionality.

This approach places the learner in an environment (the "aggregate of things, conditions and influences" which impinge on a person), and then relates changes in that environment to the resulting changes in the child's response to them. By manipulating (structuring) environment, response can be structured, and maladaptive behavior can be modified and replaced by more adjustive behavior. Two concepts are central to the behavior modification approach:

1. The emphasis is on learning theory, the effect of experience on behavior. Learning is defined as the process whereby new or altered behavior comes about as a result of prior response. It is a consistent and relatively permanent change in behavior, not one resulting from temporary conditions such as fatigue or emotional state.

2. The insistence that observable (overt) behavioral change is an indication that learning has taken

> place. When the child is inarticulate, observable behavior is the most reliable clue one has to indicate that learning has taken place; it is the most accurate basis for assessing progress. The assumption, therefore, is that any change in the environment which has modified maladaptive behavior has also caused learning in the same direction.

In the behavior modification approach, these questions are asked;

- o What behavior is maladaptive?
- o What environmental contingencies currently support this maladaptive behavior?
- o How can the environment be manipulated to alter or modify the maladaptive behavior?

Only answering these questions, however, does not result in a positive approach. Implicit in the definition of maladaptive behavior is the recognition of more desirable behavior. The teacher must complete the job by structuring the environment to replace the maladaptive behavior with a positive, adjustive one.

To implement the behavior modification approach in the special classroom, one must begin by establishing relationships between environmental stimuli and the student's responses to these stimuli. Based on these correlations, environments are then "structured" to assure appropriate responses to the stimuli.

In order for learning to take place, according to the theories of conditioning, there must first be an appropriate response to the stimuli presented before reinforcement can take place through reward. The satisfaction of reward motivates the child to make further appropriate responses. His confidence in himself begins to grow. His image of self begins to shift from negative to positive.

The structuring of a learning situation consists of establishing limitations on behavior such that appropriate behavior is more likely to occur. This concept of limitations contrasts with the currently accepted theories of permissiveness in progressive education. A normal child can function in a permissive, unstructured situation because he has control of himself; the child with learning disabilities has little control of his perceptions, emotions, or motor functions and consequently this control must be externally supplied by the classroom structure. The classroom routine of activities must be definite and dependable. The teacher must be consistent in applying the limitations which he has established. At first, the tasks should be specific and limited; later they can be broadened. There must be mutual respect for the requirements set by the teacher on the child's part and for the efforts of the child on the teacher's part.

The teacher in a behaviorally oriented classroom assumes the role of a behavioral engineer. He is responsible for engineering an environment and manipulating that environment such that the maladaptive behavior is brought into line with the standards required for further academic learning. He constantly monitors the responses of the children, provides feedback to them, and analyzes their behaviors, to manipulate the environment as required. To perform his task he must have at hand tools for measurement and observation, social and physical environments capable of being manipulated, and a wide variety of teaching aids and devices.

In Summary

There are, of course, other approaches to educating children with learning disabilities. Usually, however, they generally relate to one or more of the three described above and do not require separate treatment.

What is perhaps more important, however, is the fact that there is no "one" approach to special education. If the educational program is to be effectively housed, a careful description of that program must be developed in order to give direction to the processes of planning and design. If the approach is expected to be a variable one, then limits on its variation should be expressed. If these limits cannot be placed, then this should be clearly stated. Without this, the educator-architect dialogue cannot begin.

So far this paper has concerned itself with educational issues: the exceptional child, his learning disabilities, and general approaches taken to special education.

Now is the time to take a look at the physical environment -- what comprises it and how it can be "factored" into special education programs.

Part 5 develops the premise that the physical environment can indeed contribute to the education of these children, and that it can do so in varying degrees. Part 6 presents the basic building blocks of the built environment, and these are synthesized and applied to the problem of special education through a number of environmental "conceptualizations" presented in Part 7. Part 8 develops some program factors which have to be superimposed on these conceptualizations if one is to face a specific planning and design problem.

The final part of this paper will present directions for future work.

5 / THE ROLE OF ENVIRONMENT

The Problem of Defining the Role of the Environment

It is obvious to many that the built environment plays a role in special education. After all, special education must take place in some built space. What is the nature of this role? Is it positive, negative or neutral? How does the built environment "fit into" approaches to special education? These are the questions to which we must address ourselves.

Needless to say, most special educators have not given a great deal of attention to the role of the physical environment. When faced with answering a direct question ("Do you think it can play a part?") the answer is invariably, "Well, I've never really thought about it that way" or "Well, yes, I think it can." The specifics, however, are not forthcoming.

If there were one "accepted" approach to special education, defining the role of the built environment would be a difficult but possible task. Certainly teams of educators, architects and other "environmentalists" could sit down and thrash out physical proposals for particular special education programs and needs. As has been pointed out, though, this is not the case. There are general approaches, but nearly every special educator forges an individual approach for his particular problems. This makes the task of defining the role of the built environment, and the creation of the architectural hardware to implement that role, an extremely complex task.

Complicating all of this is the embryonic state-of-the-art of environmental research in general. We suspect that the built environment is seldom neutral in influence; people like Winston Churchill have said "We shape our buildings and afterwards they shape us". We have not been able to measure the quantity or quality of that influence though. This revolves around several issues:

o Only recent concern with the impact of environment on users. While psychologists have skirted the fringes of the issue for years, architects and other "environmentalists" have been too preoccupied with form and visual aspects of buildings to become really concerned.

- The fact that the concern crosses so many disciplines. Interdisciplinary "dialogue" is always slow in starting.
- The existence of so many "environments" in any situation. It is difficult to separate influences of the physical environment from that of the social, cultural, emotional, and dozens of other "environments" operating simultaneously.
- The fact that most people have high tolerance to defects in the built environment. Most people can tolerate and even adapt to bright light, high temperatures and garish paint, thus making assessment difficult.

Simply bemoaning the lack of work to date does not move the forefront very far, though. We would assume that if a physical environment has been consciously created, developed or sought out, it probably exerts a positive influence. But, this is not necessarily so. Today the degree of that influence, and whether it is positive or negative, is a function of completeness in the educator-architect dialogue, and the architect's own sensitivity to the problem. There are no guidelines, and the architect operates "by the seat of his pants".

An Assumption

All of this has special meaning for special education. If we as a society are obligated to use all of the means at our disposal to educate children with learning disabilities, the built environment cannot be overlooked as a potential tool. In some cases, it is designed in a neutral way, just "to let things happen"; in other instances, we can posit that it can become as potent as the book, the chalkboard, the movies, and other educational devices. Because the built environment is created and modified as a conscious act, it is capable of being manipulated. Why should it not be created and manipulated along with the other tools the educator has at his disposal?*

Three "Levels" of Contribution

It might be said that the built environment can play roles in special education programs at three basic "levels", each more sophisticated and more positive than its predecessor:

- A basic level, which assures "comfort" for its users.
- A second level, which raises the level of environmental accommodation from that of comfort to that of "therapy" -- the built environment can actually provide "healing power" for its users.
- A third level, which adds special features to the built environment so that it can be used as a positive, contributing factor in special education programs.

It is far easier to identify these "levels" than it is to explicitly define each one.

The Comfortable Level

The basic level poses no particular problems. Everyone agrees that all persons should be "comfortable" in the environment that surrounds them. Even if that environment is not playing a positive role in the activities within it, at least it is not in violation of standard and accepted parameters with regard to human comfort (heat, humidity, light, etc.). Anyone who holds himself out as a designer of built environment should provide this "comfortable" level as a matter of course.

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* It should be pointed out that this is largely the opinion of the authors, after discussing the issue with a number of persons in the field of special education. Except for occasional references to the stimulus potential of the built environment, and except for the work done by concerned architects such as Bertram Berenson and Kenneth Bayes, very little has been said about the role of the built environment in special education.

The Therapeutic Level

Many raise the thesis that this is not enough for special education; these children may not exhibit the tolerance to environmental defects that children without exceptionalities do. Therefore, the environment should be raised to a positive "therapeutic" level. Perhaps the most explicit definition of the therapeutic environment comes from British architect Kenneth Bayes.[4] He contends that the built environment can be endowed with healing power, by translating conceptualizations such as articulated transition, unambiguity, sociopetal form, scale and space-time structuring into facilities implications These will be discussed in some detail in Part 7 of this paper.

The Contributory Level

The third level, the "contributory" level, varies directly with the approach taken to special education. The thesis is that environments can be specifically planned and designed to fit into specific approaches to special education.

One set of "for instances" can be noted if one looks at the Behavior Modification Approach outlined in Part 4. The reader should be reminded that three questions are central to this approach,

- What behavior is maladaptive?
- What environmental contingencies currently support this maladaptive behavior?
- How can the environment be manipulated to alter or modify the maladaptive behavior?

Take, for example, that maladaptive behavior called "sensory hyperactivity", the inadvertent response to all stimuli within the environment (see page 3-11). Among the contingencies which support this behavior are stimulating built environments and large spaces crowded with stimuli. The environmental modification which might change this behavior and allow the child to concentrate on the task at hand is the reduction of stimuli. The classroom may be conceived as a bland environment, with everything in it a dull gray -- walls, floors, ceiling, furnishings. All of the stimulating aspects of a usual classroom -- maps, plants, bulletin boards, windows and clocks -- are removed. Carpeting is placed on the floor to reduce auditory stimuli and doors are placed on all storage cabinets to reduce visual "clutter". To further reduce the amount of stimuli perceived by the child, many learning activities take place in small spaces and cubby areas. As the child progresses in his ability to control his responses, stimuli are reintroduced into this environment.

Another "for instance" could center around perseveration, the continuation of a response long after the stimuli are gone (see page 3-12). An environmental condition which possibly supports this maladaptive behavior is the inadequate removal of stimuli: the child continues keeping rhythm to music because he still sees the rhythm sticks on the teacher's desk. One way the built environment might modify this behavior would be that of providing a strong change in environment between activities. The environment for music might be acoustically alive with moderate light and strongly patterned wall hangings; the following activity of story-listening might take place in a small intimate space with low light level and cushions on the floor.

Theoretically one could develop a whole series of approaches such as the above, approaches which educators could use as tools in special education. The problem at this point in time is that any and all of these would be right "off the top of the head". The present body of knowledge relating environmental manipulation to behavioral change is quite small. The general role that the built environment might play in special education seems quite evident, particularly when one looks at the Behavior Modification Approach.

Advancing the State-of-the-Art

Given the present state-of-the-art, the question becomes: "How can we move from thinking about the roles the environment might play to the roles that it can play?" The task will neither be simple nor unilateral. It involves many factors, and will involve several disciplines. A carefully planned program of proposal, research, testing and evaluation will be required before definitive statements are forthcoming.

There is, however, an intermediate step -- a step which can be taken long before the "results are in" (if indeed they are ever really "in"). Careful and sympathetic understanding between special educators and architects can go a long way to bring about therapeutic and even positively-contributing built environments, even if they are arrived at intuitively and subjectively.

Laying some of the groundwork for this mutual understanding of issues is the purpose of this paper.

While definitive statements concerning planning and design guidance are not possible at this time, the authors feel that this paper can present some of the "building blocks" upon which these statements will ultimately be constructed. The built environment can be conceived as a number of variables, and these variables can be manipulated and fashioned into a number of higher-order "conceptualizations" about environment.

If the architect can gain a general feeling for exceptionality, learning disabilities and special education; and if special educators can gain a general understanding of the "building blocks" of built environment, then a certain level of communication between the two is possible. When the language becomes common, meaningful dialogue on the role of the built environment in special education can at least begin. Once it does begin, one can only hope that the required research efforts will develop to test and evaluate the environmental hypotheses generated from the dialogue.

6 / ENVIRONMENTAL VARIABLES

Creating Environment a Three Step Process

The creation of the physical environment is not a one step process. Typically the architect begins with a series of environmental variables -- abstract building blocks like "space" and "light" and "texture". He takes these variables and forges them into a series of "conceptualizations" about the physical environment he is designing. From there, he goes on to select the actual hardware (doors, bricks, tiles and glass) to implement his design. The creation of architecture proceeds from the abstract to the concrete; from the designing with light to the shaping of windows. This three-stage approach is critical to the educator-architect dialogue in designing facilities for special education. The abstract building blocks are well understood by the architect, but sometimes the educator overlooks them in his ambition to discuss hardware. The notion of "conceptualization" is most important because it takes the basic environmental variables and puts them together to solve the specific problems of environment for special education. Only after specifying the environmental variables and synthesizing them into conceptualizations can the architectural hardware be considered. This Part will briefly present some basic environmental variables.*

SPACE
LIGHT
COLOR
SOUND
TEXTURE
CLIMATE
SHAPE

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* Because all environmental variables are closely interrelated, their classification and labelling can be accomplished in many ways. The approach here is to look at them as component parts of the physical environment. The important point, however, is not the particular classification system chosen, rather, emphasis is placed on gaining the understanding of the basic building blocks needed to make the conceptualizations in Part 7 meaningful for both educator and architect.

Space - an All-inclusive Variable

The one environmental variable which includes all of the others is space. When we speak of the "space" in architecture (whether it be a "room", a "cubicle" or even a "courtyard"), we are referring to it as a unique combination of all the other variables: light, color, sound, texture, climate, and shape. The weighting in any one design is determined by the total sensory impression which the architect hopes to convey.

Space then is more than the antithesis of matter; it is its counterform. In the words of Lao-Tze, "The reality of the vessel is the void within it." The making of architecture is the simultaneous shaping of space and matter. One is not the residual of the other. They are both products of the same process. Spatial perception involves all of the senses, but in varying degrees. Because visual perception of space is so evident, architects often fall into the trap of being concerned with only its visual aspects. But space cannot be experienced by vision alone; the other senses supply basic information which supports the visual sense, making the spatial experience complete.

Nor can space be considered without time. Space can only be experienced over time; architecture is experienced as the day progresses or as we move through it. Thus inherent in our perception of space is movement -- the kinaestheic sense. Space exists by virtue of our moving to it, from it, and through it over time. Perhaps Architect Aldo Van Eyck has said it most eloquently:

> I arrived at the conclusion that whatever space and time mean, place and occasion mean more ...
>
> ... for space in the image of man is place, and time in the image of man is occasion.

Spatial perception and its accompanying emotional experience are usually subconscious. In spite of this lack of conscious awareness, however, the affects of space go to the very core of our psychological make-up. The soaring space of a cathedral uplifts our spirit. The long narrow space of a corridor hastens our movement through it. The lobby of a building gives us a chance to"sigh"at having arrived. Then, too, our awareness of space can be externalized, as can be seen in the mental disorders of claustrophobia and agoraphobia.

Light

Of all the environmental variables, perhaps the one which is most familiar to us is light. We are constantly aware of it -- whether there is sunlight or not, whether it is too dark to read, whether the glare from reflected light is too great. It has less obvious effects, though. Recent studies have indicated that,

- o Light may influence glandular activity. In a study of two hundred blind girls, a correlation between light and gonadal activity was found.[31] Similar relationships have been observed in studies of the pituitary, pineal and other glands.
- o Light has influenced the sex ratio in guppies and mice.[31]
- o The alteration of the dark and light cycles of the day can upset the human biological clock, affecting fine motor movements and sensory responses. ("jet-set sickness")
- o Sunlight may well be requisite to psychological (if not necessarily physiological) well-being.

Traditional approaches to assessing the importance of light have been quantitative ones: Is there enough light on the task surface? In recognition of this, we have consistently raised the lighting standard (the quantity of light required) for classrooms. Unfortunately, seeing efficiency has not risen at comparable rates; the eye sees by comparison, and apparent brightness is determined by brightness relationships in the visual field and not by the quantity of light alone.

Another interesting aspect of the quantity problem is this: as energy stimulation goes up, the response tendency of the organism goes up with it. Brilliant light and warm colors produce autonomic arousal in the form of increased respiration, heart rate, muscular activity and cortical activity. We have increased light to improve seeing, but we have increased muscular activity which may be in conflict with that task.

Current research in lighting is emphasizing its qualitative aspects and its influences on the human being as a whole. Light can have psychological effects. Studies of the effects of windowless classrooms on learning, for example, only begin to question if sunlight is truly important to psychological well-being (as many researchers suspect).

Color

Ancient philosophers and surgeons believed that color influenced health, that it had medicinal properties. Precious stones were worn around the neck for their color value in curing disease.

We are still skeptical and superstitious about color. We know that it does affect the human organism, but we don't know how. Our interest grows when we realize that color is a function of light, and that certain wave-lengths have already been scientifically used in medical treatment (x-ray, ultra-violet, infra-red lights). It has biological and psychological effects as well. Those presented on the next page were developed by Faber Birren.[38]

To complicate things, the exact nature of the phenomenon of color is not known. Is the color in the object or within the person who perceives that object? Recent experiments with hallucinatory drugs have shown that brilliant explosions of color seem to be generated in the brain. Light has color properties. How do the color properties of light influence the color of the object? To what extent is the color which is observed, the color which the eye knows to be there, (color constancy phenomenon)? Why is flesh the same color whether one sees it at night or in the noon day sun? The fact that we don't know the answers to many of these basic questions is reason enough for many people to be skeptical of color. It is full of mystery.

The color preferences which people exhibit are often indications of their psychological make-up. There appears to be a strong correlation between color choice and personality type.[8] People who are outwardly oriented, free and spontaneous, (commonly termed extraverts), prefer warm colors. Children usually fall into this category as indicated by their love of red. On the other hand, people who are inward oriented, self-controlled, emotionally reserved and detached (introverts), prefer cool colors.

Mental and psychological disorders often produce changes in color preference from the normal. Vincent Van Gogh, during his psychotic states, painted almost exclusively in yellow.[8] This preference was

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o Red is a dynamic color. It distracts the equilibrium of the body. It raises blood pressure and pulse rate followed by a reversal of these effects. It is exciting and it increases restlessness and nervous tension. Modified forms of red are beautiful and expressive, universally appealing and deeply emotional. It helps to distract attention from within and to direct it outward.

o Orange has basically the same qualities as red. It has high appetite appeal.

o Green is pacific and tends to reduce nervous and muscular tension. It represents a withdrawal from stimulus. It provides an ideal environment for sedentary tasks, concentration and meditation.

o Bluish-green is both pleasing and "livable".

o Blue is antithetical to red. It decreases hormonal activity, lowers blood pressure and pulse rate with a reversal of these effects. It is low in attention-value, sedate and restful. It is generally a favorite universally.

o Purple is biologically neutral and has a dominant aesthetic appeal.

o White is a balanced color and emotionally neutral.

o Black is negative and emotionally neutral.

o Gray is passive and emotionally neutral.

Figure 6.1 BIOLOGICAL AND PSYCHOLOGICAL
EFFECTS OF COLOR
(Source: Faber Birren, see reference #38)

also attributed by Kadinsky. The question comes to mind as to whether there is a correlation between preferred color and therapeutic color.[4] Is the color chosen by the patient the best color for him? Should the therapeutic color be opposite to or in sympathy with the illness? Does a depressed patient need a warm color to cheer him up? The obvious answer would be "yes", but experience shows that the opposite is often required.

Color preferences change with age.[4] There is a general swing from warm to cool colors as maturity is reached. Children like strong, pure, full colors as opposed to the choice of subdued colors by adults. Some studies also indicate differences of color preference between sexes, but this evidence is not very conclusive.

Concerning color in architecture, there is the question of whether to relate the color scheme to the activity in the space or to the people occupying that space. It is probably best to relate it to the activity of the space because the homogeneity of preferences by the people cannot be guaranteed. Thus red may be suited to the room in which creative ideas will emerge and green used in the room where those ideas are carried out.[38] The color of the classroom might be related to the age of the child. Then the desk top color or locker color could be chosen by each individual child to establish his identity.

Clutter - or "Visual Noise"

A concept related to light and color is that of "clutter" --"visual noise", if you will. It begins with the number and variety of things in the visual field, and can be further compounded by their lack of order and the grouping of dissimilar things. Where there is clutter, a good deal of time and effort can be lost in just finding the object that is to be viewed. This can be a particularly significant concept in environments for children with perceptual learning disabilities. The problems of sensory hyperactivity, dissocation, figure-background reversal and perseveration can be directly related to this "visual noise".

More About the Visual Varibles

The preceding paragraphs have looked at three visually-associated variables (light, color and clutter) as single concerns. The obvious fact is that they are very closely related. Perhaps somewhat less obviously, they are inevitably related to the other senses. "Vision is not confined to the eye alone, the retina and cortical centers of the brain; it pervades the entire organism, is dynamic and has psychological qualities".[7] For instance it has been shown that,

... Sensitivity to red colors is lowered by the influence of sound, while sensitivity to green colors is increased.[7]

... Low notes tend to make colors appear as deeper hues, and vice versa.[7]

... Strong tastes and odors will depress red sensations and increase green sensations.[7]

... Weights are judged as being heavier under red light and lighter under green light.[38]

Seeing is ruled by the dynamics of the whole situation; it is influenced by our mood, temperament, stage of fatigue, memory of past seeing experiences, motivations and other factors in addition to the basic qualities of light, color and clutter.

Because so many learning disabilities relate to perception, and because light and color are such key parts of perception, current and future research on these variables should be closely followed.

Sound

Like light, we have always looked at the sonic environment in a quantitative way: How much sound is produced? How much sound is reverberated around a space? How much sound is transmitted into one space from another?

Like lighting, though, the sonic environment has both quantitative and qualitative aspects. The former are generally well developed through studies in acoustics; but the latter will require a good deal more work.

The basic problem of acoustics in buildings is to optimize the hearing component of any given activity. Some activities involve hearing to a great degree (listening to a lecture or music), while others involve negative hearing or quiet (studying and reading). Perhaps even more important to exceptional children, though, is noise -- unwanted sound which is inappropriate to the task and which must be minimized. Where there is noise,

- Shifts of attention are likely to be more numerous.
- Continual handling of information in some tasks may be impaired.
- Interrupted or irregular noise is generally worse than continuous noise.
- High-pitched noise is worse than low-pitched noise.

For this reason the control of noise becomes very important; it takes on even greater significance as educators (and even special educators) begin to move into open planning of facilities. The approach most commonly taken in these instances is to provide carpeting to generally deaden the acoustic environment, and then provide additional controls (enclosure, semi-enclosure, acoustic treatment, headphones, etc.) as they are required for specific learning tasks.

Once we move from "acoustics" to "psychoacoustics", however, the issues become far less clear; the level of knowledge is rather limited if not almost nonexistent. Differences in adaptation to sonic environments vary widely with individuals, probably depending on their sex, their age and other characteristics. The image of a teen-ager studying with the radio at full volume is a popular example of matching adaptation with age. Intuitively we understand that children with learning disabilities have low levels of adaptation, but we have not yet developed ways of measuring these levels much less compensating for them.

We are also intuitively aware of the fact that sound can be used to "shape" environment: Who can think of an intimate dinner without soft music or a basketball game without a good deal of noise? In special education, then, we can postulate that sound can be used to heighten environmental sensation and help relate activities to space -- a very quiet place for a nap, soft music in the lunch room, an acoustically "live" place for physical activity.

Another psychoacoustic concern is how the sonic environment affects learning. The general concept is that any sound which distracts is negative to learning and should be minimized. In schools, the background noise level is generally limited to that level consistent with good speech listening. But for other activities it probably should be higher and of different quality. Possibly music should be piped into schools (for certain activities) as it is in offices and stores.

Texture

The tactile sense has been generally neglected as a positive means for environmental communication. We know that it is an important sense. In the first six months of life, touch is very important as a communicative sense; the baby waits for the touch and warmth of his mother's arms. In adulthood it becomes the provocative sense of sexual love. Our culture emphasizes visual and auditory contact with people as opposed to European cultures which utilize the tactile sense more through crowding, pushing, embracing, etc.

The tactile sense can be used to communicate environment. We are all aware of the feel of carpet or wood underfoot; it contributes to our spatial perception. Young children and disturbed children like to "feel" their buildings. We all lean against walls and hold onto railings. The recent use of carpet on walls and floors has heightened our tactile sensing of architecture. Our eyes "feel" textures. We see rough buildings and slick ones, sharp corners, and soft spaces. The tactile sense must be utilized much more in architecture and particularly in schools for special education, where children "feel" closer to their environment.

Climate

The climatic environment is probably the most vital insofar as human existence is concerned. Without air, in the proper range of temperatures and sufficiently circulated, man could not live. Once these basic conditions are met, however, it appears that the climatic variable has less effect on human behavior than the other variables.

Traditional approaches to climatic environment revolve around "comfort zones". As long as temperature and humidity consistently fall within these well-established zones, it is estimated that 75% to 80% of those in a statistically typical group will be comfortable; age, sex, weight and metabolism differences will tend to exclude the remaining 20% to 25%.

There are three aspects of this traditional approach which need rethinking with regard to exceptional children:

- How statistically typical are they? Is climatic environment a greater factor in their well-being than might otherwise be expected?

- Of what effect does consistency have? Current approaches aim for a specific temperature and a specific humidity as environmental constants. What would be the effect of temperature and humidity changes, either within an activity or from one activity to another?

- Can the climatic environment be used to provide environmental cues? Bertram Berensen, for example, has done some experiments with jets of air at varying speeds to provide environmental cues for blind children.

Shape

Shape is an environmental variable that has meaning to humans through anthropomorphic connotations. Due to the complex rounded shape of our bodies, we have more positive emotional reactions to spaces with curved walls and arched ceilings. Straight walls bring neutral reactions as do right angle corners, whereas acute angle junctions are distinctly anti-human. These notions are also applicable to artifacts which humans use; furniture, tools, and automobiles.

The ways in which humans relate to other humans also have shape directives. We sit together in a circle. When we want to speak, we sit across from each other rather than next to each other. When we walk, we change directions with curves rather than right angles. We know little about the influence of shape on humans and their interactions, but we do know that it is important and must be studied further.

7 / ENVIRONMENTAL CONCEPTUALIZATIONS

An understanding of environmental variables lays some important groundwork -- after all, they are the "basics" of environment. If the physical environment is to move beyond providing for basic levels of comfort, -- that is, if it is going to be raised to a more "therapeutic" level -- then these variables must be synthesized into some higher-order conceptualizations.

The notion of conceptualizations is an important one. The kinds of statements made in this Part take the variables discussed in Part 6 and integrate them and then relate them to the problem of special education. One way to put it might be like this: "Here are some broad roles that the environment can play in educating children with learning disabilities". We are still not speaking of hardware (although comments about hardware will be made to illustrate the conceptualizations) -- but we are beyond the point of talking about "light" and "space" and "texture".

It is a basic premise of this paper that some past attempts to develop planning and design guidance for these kinds of facilities have failed because they did not go through the "conceptualizations" stage; they assumed that one could relate the abstract variables directly to architectural hardware.

The state-of-the-art does not give us a clear listing of those environmental conceptualizations which directly relate to special education. One occasionally encounters references to one or two of these, but nowhere can a complete list be found. For this reason, this Part will present a set of conceptualizations developed by the authors of this paper:

1 SPACE-TIME IDENTITY

2 AMBIGUITY

3 ARTICULATION

4 TRANSITION

5 DECISIONS AND ALTERNATIVES

6 CONSISTENCY

7 SCALE

8 SOCIOPETAL-SOCIOFUGAL

9 PRIVACY

10 TERRITORIALITY

11 USEABILITY

12 MOVEMENT

13 CHARACTER

This set can hardly be held out as all-inclusive. It does include, however, what the authors believe to be, some of the underlying environmental issues which must be considered in the planning and design of facilities for special education.

Each conceptualization is briefly presented in the following pages, and where possible, examples and "for instances" relating to the built environment are given. It should be noted that these examples are for illustration only; the state-of-the-art of environmental and educational research has neither confirmed nor denied the relevance of any of them.

I

space-time identity

A rather common characteristic of children with learning disabilities is an underdeveloped understanding of the space-time continuum. The child cannot grasp the meaning of time in relation to space and movement. Granted that the concept of time is a difficult one for all children; it takes six to seven years before the concept of clock-time is truly understood. But long before this, most children grasp the meaning of time in relationship to their own identity in space. This intuitive understanding is a fundamental one, and the physical environment can play an important role in its development.

Time acquires meaning through structuring by natural or cultural forces. The space-time continuum requires the same kind of structuring. To know where you are, where you have been, and where you are going is important in evolving one's activities in space.

The poorly-design physical environment can do a great deal to reinforce any already distorted sense of space-time:

- Walking down a long corridor with identical doors spaced evenly in identical walls makes time slow down since one's progress is not apparent and the end seems an eternity away.
- Moving through identical spaces or amongst identical buildings gives one the impression of standing still -- the feet are moving, but the scene isn't.
- Listening to monotonous sounds like fans, motors, and fountains can similarly make time slow down or even "stand still".

If the environment can reinforce space-time distortion, it would seem that it could also help ameliorate the problem and help establish space-time identity. Possibilities include,

- Using a ray of sunlight marching across a modulated wall to demonstrate the passage of time.
- Using calendars with seasonal pictures, clocks with colored discs, and growing plants to make time more real.
- Considering the sequence of physical environments the child passes through in his daily routine, providing not only variety but also definite "breaks" and "punctua-

tions" to help indicate that he has passed through space over time. (This could also help combat perseveration).

- Providing mirrors and possibly other devices to reinforce a child's body image and to relate his actual physical movement to his feeling that he is indeed moving through space.

- Laying out his daily paths so he remains "oriented" both inside and outside the building. He should always be given some sense of where-he-has-been, where-he-is, and where-he-is-going.

- Ordering architectural space on the basis of space-time interdependence rather than functional grouping, that is, making activities which are adjacent in time also adjacent in space.

ambiguity

2

"There is almost universal agreement on the necessity to avoid ambiguity in buildings for emotionally-disturbed and mentally subnormal children".[4] The concept pervades many architectural decisions for these children. All children must develop a certain sense of security, confidence and comfort in relation to their environment, but children with perceptual, motor, and psycho-social disabilities are in even greater need. Because their perceptual development may be stunted, visual "tricks" in the built environment only confuse them. Ambiguity leads to frustration, and frustration may augment already prevalent psycho-social problems.

Sometimes architects create ambiguity consciously, and other times they do it unconsciously. Some ways of avoiding it in learning spaces for children with learning disabilities may include,

Expressing environmental cues directly, such as,

- o Disclosing all light sources, natural and artifical (thus avoiding the "where does it come from" problem of indirect lighting, elaborate skylights and light-traps).
- o Avoiding floor-to-ceiling glass panels which are neither window nor wall and which tend to produce confusing reflections.
- o Using matte rather than polished surfaces; for instance, people seem to "float" when walking on highly-polished floors.
- o Avoiding highly rhythmic patterns which may confuse the senses; a floor with alternating black and white tiles seems to "pulsate".

Using materials and assemblies in an "honest" way, such as,

- o Using real building materials rather than "fake" ones. A brick is supposed to be hard when you scratch it, not break like a piece of plastic! Modern building features such as wood-grained plastic, brick-patterned linoleum, false fireplaces and doors which lead to nowhere have little place in a school for these children.
- o Keeping away from "illusionary" design; avoiding design "tricks" such as mirrors and small-size doors to make rooms appear larger

Maintaining the structural integrity of the building, such as,

- Showing a simple transfer of load in the building's structural system, avoiding supports, cantilevers, and overhangs which seem to defy the forces of gravity.
- Presenting the building as a relatively substantial piece of work; it shouldn't look like it can be taken apart with a screwdriver.
- Avoiding "neat" details such as glass door transoms with no supports (it looks like a guillotine).

articulation 3

Articulation can be important to environments for special education. An "articulated" environment is one where the various pieces or parts are "called off" from the others; it displays the fact that it has different parts. It is probable that an articulated environment can be meaningful for special education in these ways:

o It can help the child recognize and prepare for changes in activity and behavior.

o It can help with problems of sensory hyperactivity by carefully controlling the kinds of physical stimuli associated with various learning tasks. An area for concentration may be low in stimuli, and an area for reaction much richer in stimuli.

o It can help with problems of dissociation by allowing the student to perceive meaningful wholes rather than parts. The amounts of clutter and visual noise, for instance, may be significant.

o It can help with problems of perseveration by assisting the teacher in providing a very definite "stop" to one activity before starting another.

This kind of thinking not only applies to articulation among spaces inside the built environment. The articulation between indoors and outdoors can become important, too. While it may be architecturally fashionable to "bring the outdoors in" through large panes of glass and interior plantings, the exceptional child may become confused: "Where do I stop playing ball? Why do they get angry when I throw the ball here in the hall?"

Where required or justified, articulation should be clearly expressed architecturally. The designer should also be reminded that effective articulation involves all of the environmental variables. Too often we try to achieve it only in the visual field — winding up with "junkpile" architecture.

transition

4

Articulation places great emphasis on transition. Transition can be thought of as the "joint" or the "link" between things which have been articulated. As such it becomes very important to architecture; in the words of Van Eyck: "To go in, out, to enter, leave, or stay are painful alternatives". The transition space is the inbetween realm; the place between two places.

- The entrance to a building is a major architectural event; the entrance to a school for special education should express the psychological relief of having arrived.
- The transition space from corridor to classroom should allow the child to hang up his coat, go to the bathroom, and prepare himself for learning activity.
- The transition space from classroom to lunchroom should allow the child to wash his hands, obtain his lunch, and psychologically prepare himself for large group activity.

"Transition" spaces between activities take on new importance — they are no longer "in-between" areas, but are places in themselves. For example, many have suggested that a child just arriving from a long and probably unsettling bus ride should be "decompressed" before entering the learning and working environment. This decompression space then becomes a design problem in its own right.

Some transitions must be strongly articulated whereas others can be more fluid. There are transitions of all kinds in buildings — between quiet and noisy, dark and light, hard and soft, large and small, warm and cold, active and passive, learning and playing.

decisions and alternatives

5

Related to ambiguity, articulation, and transition is the question of the decisions which the user of a physical environment must make to simply exist within it. There are two extremes which must be avoided in designing for the child with learning disabilities:

No alternatives for the child may well result in frustration. For example,

- He gets bored waiting for the elevator, but he cannot find the stairs.
- He wants to leave the room and sees an exit which he cannot use (a large window, a firedoor, etc.) or cannot get to.
- He walks into a room and wants to sit down but cannot get to empty seats.

Too many alternatives (or undemarcated alternatives) for the child may also result in frustration. For example,

- He is faced with glass sidelights the same size as the doors they accompany.
- He is faced with rest room doors with no clear designation for "boys" and "girls".
- He is faced with multiple-branching corridors and no cues as to which he should take.
- He is faced with great banks of doors, particularly in lobbies, which all end up in the same place (but he may not know that).
- He sees many identical rooms with identical doors and cannot figure out where he should be.
- He sees many different activities proceeding simultaneously in a space and cannot decide which to join.

consistency 6

The last several conceptualizations have, among other points, made a case for variety and punctuation in the physical environment. While this is necessary and desirable, particularly in dealing with perceptual disabilities, one cannot overlook the fact that the built environment must also provide a degree of consistency for the child. Among other things he is learning to manipulate his surround, and it should provide him with successful experiences in doing this. The lack of consistency in his behavior must be compensated by consistency in the environment.

Consistency, however, is an ephemeral quality. It does not mean that everything must be gray and bland. In fact, a thoroughly articulated environment can be (through careful design) a consistent one as well. Consistency is brought about on almost a subconscious or subliminal level. Examples include,

- Doors which generally swing the same way.
- Hardware on doors, windows, cabinets, and even toilet partitions which is not only simple to operate, but which is consistent throughout.
- Avoiding seemingly meaningless differences in colors, textures, lighting patterns, and surfacing materials. Why should one floor be green and another brown?
- Careful consideration of changes in the environment such as furniture rearrangement, paint color changes, space use alteration, and shifts in lighting level and quality. These changes should not be made suddenly "over the weekend".

scale 7

Scale is that property of the physical environment which relates it to the measure of man. Relating a building to a child's scale -- to his measure -- is an important way of giving him a sense of security and belonging. This can be done in many ways:

- The exterior appearance of the building can be made to appear more small, and it is possible to keep the building from "looming" over the child as he approaches it. Careful attention to site development, earthwork, planting, approaches, steps, fenestration, parapets, and other features of the building's facade can all help.
- Size of doors and openings and the location of operating hardware will help provide appropriate scale if carefully considered.
- Heights of blackboards, shelves, windowsills, and stair railings are scale "indicators" (or reference points) for children, and they can cause a good deal of frustration if poorly located.
- Areas which are strictly child-scale may assist in some programs. Bertram Berenson, for instance, has experimented with a series of child-scale "boxes" for creating spaces within spaces.

It is possible to overdo scale accommodation though, making the teacher look like Gulliver in the land of Lilliput. Adults may cause enough problems for some exceptional children, and heightening their "adultness" through deliberately small-scale spaces can do more harm than good. Some schools attempt to get away from this problem through simple environmental features: a blackboard which can be adjusted to child and teacher height, for example.

8

sociopetal-sociofugal

Most of the conceptualizations mentioned so far relate to perceptual issues. While these issues often touch on or even trigger psycho-social or motor problems, little has been said about these two areas so far.

The next several paragraphs will discuss the physical environment as a socializing mechanism and will present some conceptualizations which relate to environments for children with psycho-social learning disabilities.

Most of this revolves around the "sociopetal-sociofugal" dichotomy developed by Dr. Humphrey Osmond.[4] This dichotomy refers to the sociological disposition of space in architecture.

o a SOCIOPETAL plan encourages the development of stable human relationships, drawing people together and assisting them in interacting with one another. It is centripetal in tendency and brings people to the center. The plan arrangement of the home or the church is basically sociopetal in nature.

o a SOCIOFUGAL plan discourages the formation of stable human relationships by keeping people apart. It is centrifugal in tendency and propels people to the perimeter of the plan. Airports, hotel lobbies, and libraries usually present sociofugal plans.

The old fixed-seats-in-rows classroom was basically sociofugal. The origins of this type of classroom are obscure, but it seems likely that it was developed to reduce interaction and communication among students and to focus their attention on the front of the room.

Concepts in education (and particular special education) have changed, though; they are now more sociopetal in nature. Layouts and arrangements should reflect this.

An environment designed with these thoughts in mind is one which,

o Controls the number of people within sight at any one time, since visual contact facilitates interaction.

o Considers the size of the space in relation to the number of persons it houses: overcrowding and overconcentration (too many people and too little space) are avoided.

- Responds to the principles of social ecology, the dynamics of social grouping and interrelationships. Space size and relationship is important in controlling group size and selection.

- Does not continually draw people to the center (sociopetal only) or to the perimeter (sociofugal only), but allows a number of levels of sociability -- large group, intimate group, complete privacy.

- Allows easy and unobtrusive movement between increasing or decreasing levels of sociability from lunchroom to classroom to cubicle, for example.

- Allows transition between zones of equal sociability without disruption -- a sensory hyperactive child moving from one area of privacy to another (say, from a cubicle to a locker) should not have to go through a large group area (say, a corridor).

- Places great design emphasis on the larger group spaces. If these are to foster interaction (that is, become sociopetal), they must be carefully designed -- larger spaces often end up propelling their inhabitants to the walls and corners rather than to the center.

This suggests that architecture can be used to assist in ordering the child's interactions with other children, with his teachers, and even with himself. The sociological nature of the built environment is one of its most profound -- and also one of its most unstudied -- aspects.

9

privacy

There is no functional equivalent for the essential quality of privacy. Privacy has many aspects; it can be visual, acoustical, physical and psychological. The opportunity for privacy is essential to good mental health and the development of personal identity.

Because psycho-social disabilities are so prevalent among children with learning disabilities, and because privacy represents one pole of the sociability spectrum, the special educator often attempts to "manipulate" opportunities for privacy. He often prefers to provide the child with a choice of "how private" he wants to be at any moment, but he also works to bring the child into social situations as he is able to cope with them.

This can place some very heavy demands on architecture. The need for places with varying degrees of privacy must be carefully plotted with the educators who will use the building. Where private areas are to be provided, they must be private. Doors must be solid and properly hung with substantial securing hardware. The walls must be solid and insulated against acoustical intrusion.

One place in the school where privacy is always an issue is in toilet areas. There are different kinds of toileting arrangements which afford different degrees of privacy (public toilet, washroom, private toilet). Regardless of the arrangement there is usually a hierarchy of privacies required; visual, acoustical, space-time (shared use of facility over time), and psychological.[22] Ideally, each toilet would be in a separate room with a locking door and completely sound proof. There should be enough of these rooms to minimize the psychic intrusions of sensing another person's previous use. Wet soap, warm seat, and odor can go a long way to destroy psychological privacy.

territoriality

10

Closely associated with the concept of privacy is that of territoriality. This concept, which can be called the defense of privacy, was first established by observing animal behavior and has since also been observed in human behavior.

In simple terms, it is "a place to call my own", and the accompanying establishment and defense of that place. People exercise territoriality in the selection of a "favorite chair", and in the positions they choose in a classroom, in a restaurant, and even in a group waiting for the bus.

Territories can be more easily defended if there are physical features which can be called upon for help. For example, a corner seat is easier to defend than one out in the center. In planning spaces for territoriality, it might be wise to suggest,

- Classrooms and other group areas might have more than four corners.
- Each child will assume (and should therefore be given) some territory of his own: a desk, a cubicle, or a locker.
- Children should be allowed to exercise the defense of their territory by personalizing it with drawings, color, writing and other things.

From all of this comes the reassuring feeling of knowing that one's individuality is respected. This may be particularly critical with children who already suffer from a poor self-concept.

useability

11

Physical environments are designed to be used. We constantly manipulate them. We open doors and windows, we turn on switches and plug things in, we attempt to traverse them, and we constantly try to make them conform to our immediate needs.

Human tolerance to problems in using environments is very high. We curse but tolerate sticking doors, steep steps, complex hardware, slippery surfaces, and seemingly senseless changes in floor level. Exceptional children, however, may not exhibit these high tolerance levels. The problem may be a motor one; or it may revolve around a wide range of perceptual or even psycho-social disabilities. In any case, frustration in using the building and its appurtenances may further aggravate psycho-social disabilities.

This is the notion of architectural barriers; barriers to useability. In each physical environment, those barriers related to the disabilities of the exceptional children housed there must be eliminated so that they can use the environment to their fullest potential.

The issue of useability has several aspects:

- Consistency and space-time identity, noted before, have a great deal to do with the child's perceptions of an environment's useability.
- Attention must be paid to anything that the child must operate: doors, windows, steps, rails, cabinets, blackboards, serving lines, lockers, desks, and a hundred other items. The criteria are, once again, simplicity, honesty, unambiguity, and consistency.
- Attention must be paid to every horizontal surface the child may traverse.
- Seemingly senseless barriers must be avoided. Large panes of glass across circulation areas, endless changes in levels, and poor location of fire and security doors can all present problems.
- Similar emphasis must be placed on the external environment (grounds, walks, play areas, bus loading areas, etc.).

movement

12

Many of the conceptualizations mentioned so far relate to the essential problem of movement in, out, and through special education facilities. Movement in a building is an important part of using it. It takes on added importance when one looks at the disabilities found in exceptional children -- nearly all of them pose problems in movement. Architecture should recognize these problems.

In ordering the movement system in special education facilities, there appear to be several important considerations.

- Environmental cues to movement can facilitate student circulation. Colors, shapes, textures, materials and graphics can all be employed to accomplish this end.
- A basically "simple" circulation pattern can help the exceptional child to remain oriented in time and space: to know where-he-has-been, where-he-is, and where-he-is-going. Circulation paths should be well enough ordered to avoid ambiguity and to assist the user in making movement decisions.
- Long and monotonous corridors only serve to reinforce perceptual handicaps. Space-time distortion, ambiguity, and frustration with decisions and alternatives can all result. Where corridors of any length are necessary, they should be handled with the greatest care.
- Corridors and highly-channelled circulation paths are basically sociofugal and should be carefully designed. Where possible, circulation spaces should be developed as activity spaces in their own right and not just regarded as channels from one place to the next.
- Movement areas in and out of buildings should take motor difficulties into account; they should not present architectural barriers.

A successful movement system will not only result in ease of circulation for the child, it will also increase his own confidence in his ability to cope with his environment. This is important in fostering a more positive self-concept.

character

13

It seems that no discussion of environment can pass without some reference to its "character". Like scale, it helps make the building suit or fit the occupants. Too often we have considered that the environment for educating the exceptional child has no unique character of its own -- it should look like a "home" to provide comfort and security, or it should look like a "school" so these children will not feel out of place.

All of this talk is somewhat out of place. If the preceeding conceptualizations about the environment have any merit at all, and if they can be translated into bricks and mortar, then the learning environment for these children will evolve its own unique character. It won't be a "home", and it won't be a "school"; it won't be an institution, and it won't be a clinic; it will be what it is.

And lest we fall into the trap of believing that everything in the child's environment must have a reason for being there, perhaps something else is needed: something simply for the fantasy of the child. It might be a playful sculpture or a colorful mural; it might be many whimsical shapes or some bright colors. Exceptional children, after all, are still children.

8 / PROGRAM FACTORS

A Set of "Superimposed" Factors

Part 7 provided some insight into what have been termed "some basic conceptualizations about environment for special education." These conceptualizations stemmed from the learning disabilities themselves -- and the roles that the physical environment might play in actually ameliorating them. They are innate qualities of all environments for all children with perceptual, motor and psycho-social disabilities.

There is more to a specific built environment (a classroom, a wing or a school) than these innate qualities though. The environment must be built, it must be built in a specific place and it must house a specific program which will add some of its own requirements. In addition to these specifics, the built environment must serve an ever-changing population of teachers and learners.

This suggests that there are some additional factors which must be superimposed on the basic conceptualizations. These do not stem from the direct needs of the learner, but rather they arise from the educational program in which that learner is placed. This program represents the viewpoints of the teacher, the administrator, the parents, and the community.

Once the child (with his viewpoint and his needs) is placed in a specific program, run by particular people in a particular place, a series of "program factors" must be superimposed on the "basic environmental conceptualizations" developed previously. Some of these program factors include,

CHANGEABILITY
EDUCATIONAL TOOLS
FLEXIBILITY
THE SITE
INTEGRATION AND SEGREGATION

"Changeability"

The past discussion has taken the tack that it is possible to "tailor" physical environment to the needs of the child; that it can possibly help him with his perceptual, motor and psycho-social learning disabilities.

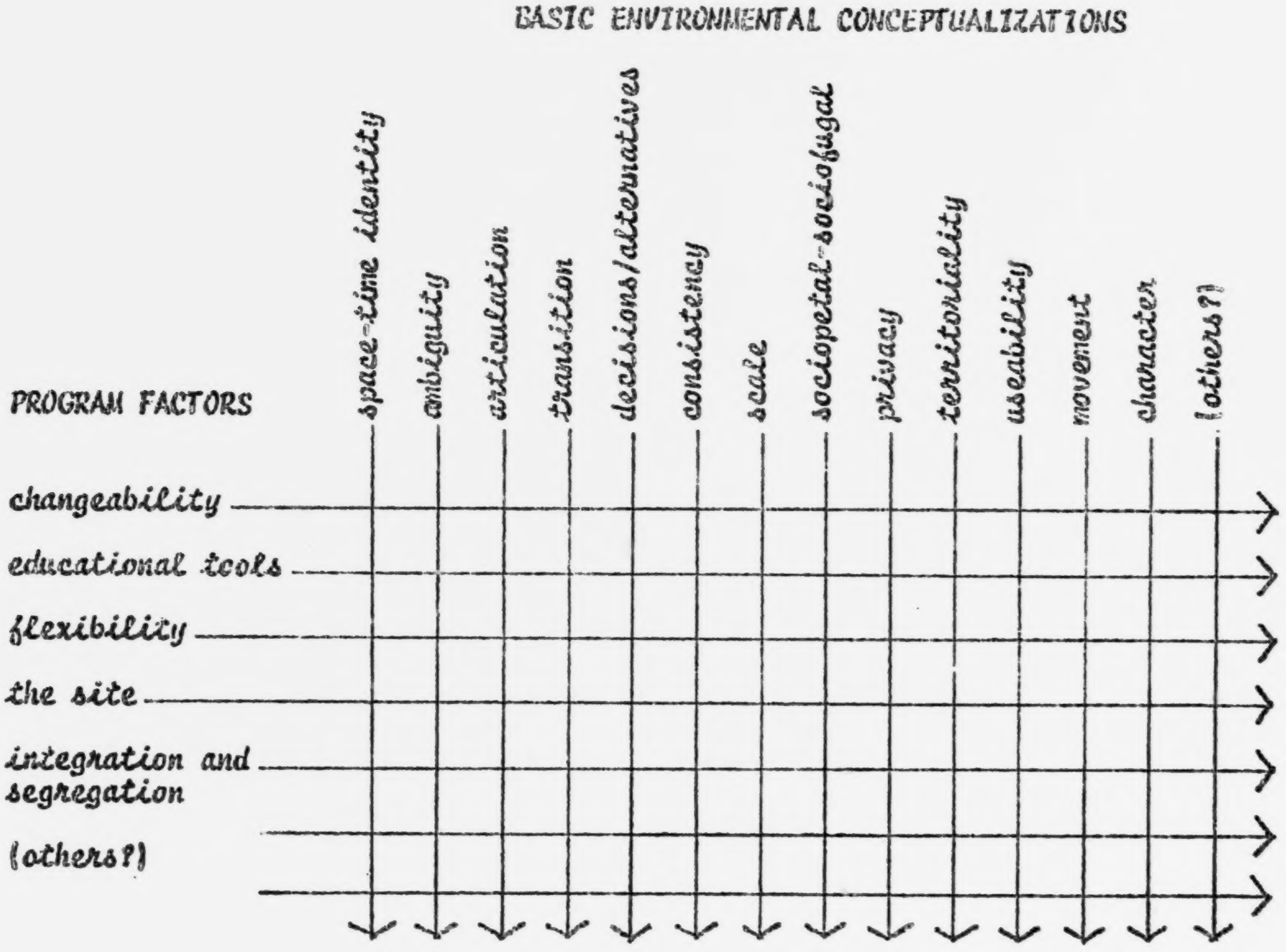
BASIC ENVIRONMENTAL CONCEPTUALIZATIONS
space-time identity
ambiguity
articulation
transition
decisions/alternatives
consistency
scale
sociopetal-sociofugal
privacy
territoriality
useability
movement
character
(others?)
PROGRAM FACTORS
changeability
educational tools
flexibility
the site
integration and segregation
(others?)

Figure 8.1: PROGRAM FACTORS: "SUPERIMPOSED" ON THE BASIC ENVIRONMENTAL CONCEPTUALIZATIONS FOR SPECIAL EDUCATION

This is a fine concept, but it becomes evident very quickly that this "tailoring" must be approached with caution:

- The child's own needs change, in a small way, from minute to minute.
- The child's own needs change, in a larger way, from week to week and year to year.
- Eventually the child leaves the facility, to be replaced by another child who is unlikely to possess the same set of disabilities.
- Even when the child is in the facility, he is more than likely to be considered as part of a group -- and the needs of the group must be superimposed on the needs of each individual in the group.

This suggests that the physical environment must be "changeable" in at least three different ways:

It must accommodate the individual child and his changing needs. Some have suggested, for example, that a child with sensory hyperactivity should be placed in a low-stimulus environment. If he forever remains in that environment, though, how will he ever learn to cope with stimuli? Shouldn't the environment provide a kind of sequential challenge presenting him with an ever-increasing number of stimuli to perceive? This becomes most critical in special education programs whose acknowledged objective is to return the child to a "regular" milieu as quickly as possible.

The implication for planning and design is obvious; its translation into architecture is much less obvious: within each conceptualization mentioned in Part 7, the architect should strive to provide a range of environmental interpretations. For example, special window shields might be provided to allow for variation in exterior visual stimuli. The use of non-loadbearing interior components might allow the creation of spaces with varying degrees of articulation.

It must accommodate the group as well as the individual. The teacher's problem of individual vs. group is central to all special education programs. The teacher realizes that the children are different, that they possess different disabilities in different degrees, and that they are overcoming them at different rates. Consequently, he attempts to work with them on a one-to-one basis as much as possible. He must, however, also consider his class as a group. They must do things together and they must, for the most part, exist together throughout the day. One child's behavior can "upset" the group, and sometimes the group can "upset" the child.

The architectural problem here is an interesting one: How can environment be "tailored" for the group and for the individuals in that group at the same time? Some people who have become interested in the role of the physical environment in special education have suggested experimenting with a two-part approach.

1. Provide a group environment which can be "manipulated" for the needs of that group. This assumes that there is a certain consistency in the learning disabilities among the children in the group, and that there is indeed a "group mind" or at least "group behavior".

2. Provide related individual areas which each child can tailor to his own needs when he wants to or when the teacher wants him to move away from the group.

It must accommodate new children with new problems. Architecture has yet to come up with the truly "disposable" environment; hence, it can be predicted that any contemporary facility for special education will be serving more than one "generation" of students. When a student moves from the school, another will take his place. The environment must provide for this changing school population.

If the built environment attempts to fulfill the two needs above (i.e., it accommodates the child's own changing needs and it accommodates both groups and individuals), it should have little trouble in accommodating new children with new problems.

Educational Tools, Equipment and Media

Special educators are beginning to develop and employ a wide range of educational tools, equipment, and audio-visual media in their work.

Many of these tools have great potential in working with children with learning disabilities. Audio-visual media, for example, can be used to create very pervasive and captivating environments. These environments can be "perceptually-directing", aiding the child to focus his attention on specific tasks without outside interference.

As an example, consider the motion picture. When the lights are out and the movie is being shown, it has created a "mini-environment" in the room: extraneous stimuli are filtered out and attention is directed to the screen and speaker. The architecture can, however, mitigate against these created environments, if it is not designed with them in mind. If it is necessary to place the noisy film projector in the center of the group, for instance, the "perceptually-directing" environment would be destroyed. The children would more likely be drawn to the projector than to its image.

Another problem with these tools and devices is clutter. As they are introduced into the existing classroom, there is no place to store them or to set them up, and they are "all over the place". This can only aggrevate problems of sensory hyperactivity and motor hyperactivity.

In terms of planning and design, then,

- The tools should be considered as integral parts of the environment from the beginning.
- The particular types of mini-environments which the tools hope to create should also be considered from the beginning. The architecture should then facilitate their creation.
- The technical requirements cannot be overlooked. These tools may have implications for lighting, acoustics, materials, cabinetwork, and power provision.

Flexibility

The problems of accommodating changeability and new tools suggests a third factor which is important in providing facilities for special education: flexibility. If environments were "disposable", or if one institution could create an infinite number of special-purpose environments to meet every possible situation, there would be no problem.

Environment is not "disposable", though, and the realities of life force us to make one space or group of spaces to do many things. We ask these spaces to provide for some basic conceptualizations which attend exceptional children (Part 7), but then we also ask them to accommodate changing children and changing needs. We ask them to be articulated and yet consistent from the child's point of view, but changeable from the teacher's point of view. We ask that a variety of spaces be provided to satisfy many conditions, and yet the realities of budget require us to provide a minimum amount of square footage. The only "answer" to these conflicting requirements is flexibility.

Flexibility must be carefully considered, though. Every time an educator or an architect makes a move in that direction, he should ask himself one set of questions: "Am I violating any of the environmental conceptualizations which attend special education? Am I aggrevating space-time distortion? Am I creating ambiguity? Am I violating territoriality? Am I impeding movement? Am I making the environment inconsistent?" Certainly any attempt at flexibility which does not greatly compromise these precepts cannot be faulted; and for very practical reasons, it must be encouraged.

There is another dimension to flexibility, too. Once the possibility for easy change is incorporated into a building, it might be used to educational advantage. Since we learn from the environment, we can also learn from changing it. Children in school develop their relationship to physical environment by changing it; they exhibit great fascination in building "houses" for themselves from cardboard boxes and adult furniture. Environment can grow with the children -- chalkboards can slide up and desks can be made larger.

This learning aspect of the educational environment is not well-proven for "regular" children, and has hardly been explored for exceptional children. The "Hawthorne effect" might be used as an educational tool. If a novel environment stimulates an exceptional child to greater achievement, then maybe we should keep changing it to retain its novelty.

Architectural flexibility can be created in many ways; there are many contemporary research efforts in developing architectural components which will provide "real" flexibility in buildings. Since this effort is so well documented, it is not necessary to elaborate on it here. The point to be made is a simple one: flexibility is necessary (and perhaps desirable in an educational sense) in facilities for special education -- if it is accomplished with some basic environmental conceptualizations well in mind.

The Site

Architects and educators alike are typically concerned about the "indoors". For this reason, one should quickly make the point that many of the conceptualizations about environment for special education, that were developed in Part 7, can be realized out-of-doors, too.

Some in the education field believe that educators and architects are missing a great potential by de-emphasizing the site. Dr. Russel Wilson and his wife, Dr. June Wilson, of the University of Michigan, contend that the "land is for learning." They have adapted sites to the teaching of agriculture, botany, biology, ecology, geology, climatology, physics and chemistry. In addition they feel that the site can be used to develop life style and personality through experiences of beauty, recreation and physical education. A school site which is carefully designed with plants, animals, water, nature trails, earth forms, etc. has great educational value. There is evidence that this kind of direct educational experience with the land can be effective in special education. Children who have emotional or psychological problems have been known to "open up" when brought into direct contact with nature; withdrawn children may respond to the affection of a puppy while sitting under a tree.

For children who have below-average mental capacity, most special educators hypothesize that a good deal of "hands-on" experience with concrete objects is essential to learning. The site can pose a great deal of potential in doing just that. The study of plants (biology), for example, becomes more meaningful and lasting if real plants in the field are utilized in the study.

Integration
and
Segregation

Finally there is the issue of segregation and integration: to what extent should children with one type of exceptionality be mixed with those with other exceptionalities? And to what extent should exceptional children be mixed with "normal" children?

These are not architectural issues. But their resolution has a profound impact on architecture, and that is just the way it should be: the educational decision should shape the architecture and not the other way around.

This seems so obvious, and yet it is easily overlooked. In their haste to build, many special educators are guilty of telling the architect to "go ahead" while they debate the issues, only to realize that after many months have passed, there is no longer an issue to debate -- the architect has settled it for them. Nor can we lay all of the blame at the feet of the educators; many architects have deep personal convictions of their own and, if allowed, will wittingly or unwittingly "play" educator and make the decisions.

The educator must make this decision and he must make it early. Depending on the outcome, he may end up with facilities which range all the way from a few special features inserted into regular schools, to wings added on to existing schools, to small-scale special education pavillions, to sprawling campuses for exceptional children.

The educator should be ever mindful of the commitment that architecture represents. The location of a building is a physical commitment of the highest order. Even when it is flexibly conceived, it is a commitment that surely pervades the life of every person who will ever use it, and for every day they use it: "We shape our buildings and afterwards our buildings shape us".

Status 1969

This paper has attempted to place the entire issue of the role of the physical environment into perspective; it has attempted to provide some insight into where we are now, and it has attempted to lay some groundwork for advancing the state-of-the-art.

If nothing else, this paper has probably left the reader with the impression that many, if not most, of the issues remain clouded:

1. Special educators have had a difficult time determining the causes of exceptionality and the precise nature of learning disabilities. There are few widely accepted approaches to special education, and few special educators have given much thought to the role of the physical environment in these approaches.

2. Architects have had an equally difficult time isolating environmental variables, and evaluating their influence on the users of built environments. Nor have they effectively used what little is known in designing buildings for special education.

3. Because both parties have had a hard time getting started in their own fields, the educator-architect dialogue is incomplete if not nonexistent in many cases. The key environmental conceptualizations presented in Part 7, for example, are largely proposals by the authors of this paper based on what they have been able to synthesize from interested educators and architects; certainly they do not represent any level of consensus.

The Need to Advance on Many "Fronts"

This all leads to a very simple question: What must be done? If the problem statement is to "define the role of the physical environment in special education (that is, the education of children with learning disabilities)," then one point becomes clear: the next step cannot be a unilateral one. The special educator must do something. The architect must do something. And the two must do something together.

In line with this thinking, this Part will propose five fronts which should be attacked in advancing the state-of-the-art:

A. The educator-architect dialogue

B. Basic environmental research

C. Integrating the environmental variable into educational research

D. Specialized design research

E. Case study evaluations of special education environments

These five "fronts" present a wide spectrum of activities, from "basic" research to some special studies to case study evaluation and reporting. Some are more significant (in the long run) than others; some will require more resources than others. Some should be accomplished by educators, some by architects and their collaborators, and some by both.

It can be argued that such a mass assault will cause problems of coordination and duplication. This is true. The current paucity of any really useable information in this area, though, leaves us no alternative.

The Educator-Architect Dialogue

It may sound trite, but a meaningful educator-architect dialogue is at the very heart of advancing the state-of-the-art. Each must understand the other's motives and objectives, and each must understand why the other is important to creating successful environments.

A major step in this direction has been taken by the Council for Exceptional Children of the National Education Association. Through their"Physical Environment Special Education" project, they are trying to establish the relationship between educational objectives and architectural program goals. They have extensively surveyed existing facilities and analyzed the processes which created those facilities. They are attempting to uncover areas where the educator-architect dialogue broke down and how it affected the resulting facilities. Through careful examination of a number of case studies, they will (in the fall or winter of 1969-1970) provide guidance on the most effective way of going about planning facilities for special education.

This is a good start. There are some additional ways of creating dialogue and making it meaningful:

1. Exploit every possible opportunity for dialogue. Every opportunity should be taken to stress the need for dialogue. Until direct planning and design guidance comes along, the only way a single educator and a single architect can reach common thinking is to talk. This talk will only happen if the two parties think it will be useful. Educational and architectural journals can foster dialogue through their editorial policy and the articles they sponsor. Organizations such as CEC and EFL can encourage dialogue by bringing together interested parties.

2. Report case studies of "successful" projects. The reporting of significant new buildings will always be valid; it helps to keep both parties abreast of current developments, new approaches in education and architecture, and innovative solutions.

The case studies should be chosen for their success in the design process as well as the quality of the physical product. In write-ups, the role of program in determining architecture, and the subsequent functioning of that program within the architecture, should be stressed. This suggests in-use reporting rather than descriptions of new or yet-to-be-built projects. The reporting should be done by persons or groups who are familiar with the state-of-the-art of facilities for special education; although "significance" cannot be directly measured, at least we can assign relative values by allowing competent and knowledgeable persons to select the case studies.

3. Factor physical environment into teacher education programs. Architects often wonder why educators want "complete flexibility" or why they make statements like "let's get the architecture out of the way." Usually it's not their fault. At no time in their education has anyone even suggested that the physical environment might be an effective educational tool.

One approach could be to incorporate material on "environmental methods" into teacher education programs. These programs couldhelp teachers explore ways in which the environment might be used to strengthen the educational process. How do you best arrange chairs to encourage collaboration on a task? What kind of lighting creates a fitting mood for story time? For what tasks might the children use the floor as a working surface?

The objective of this kind of education would not (for it could not) be a collection of "helpful hints" or "how to's". Rather it would be awareness; awareness that the physical environment can be manipulated as much as chalk, pictures, and class schedules to construct learning situations

Whether this becomes part of a college curriculum, is a summer workshop, or is offered as in-service material is not important; the need is so great at this point in time that all approaches should be taken. When educators begin realizing that physical environment is important, it is axiomatic that they will seek more meaningful dialogue with their architects.

4. Consider the workshop as a means of "structured dialogue". The dialogue can be force-fed through collaborative brainstorming by educators and architects who are faced with specific situations When closeted together and faced with the need "to get something on paper", past efforts have proven that educator and architect can reach amizingly high levels of communication The NIMH-Rice design fete on architecture for the community mental health center, and the USOE-Ohio State educational facilities charette represent attempts in this direction. Both were short-term, intense, results-oriented; both included educators and architects; and both set definite objectives for their work.

The charette approach can never replace solid educational environmental research; and one should be careful in attempting to generalize from them As idea generators for a specific problem, however, they can be superb

Basic Environmental Research

The problem of the physical environment in special education is related to the whole field of environmental research. Just as exceptional children are basically normal children with some special needs, so so is the physical environment of the special school basically similar to the regular school but with some special needs. Consequently, a great deal of valuable and pertinent information may be gained through basic environmental research.

There are two aspects to environmental research: what to research, and how to do it. The first poses no problem; there is no dearth of unexplored or only partially-explored areas (witness the problems encountered in this paper in finding meaningful environmental research.) The second problem area - methodology - is a complex one, and perhaps it is our unsuccessful efforts to establish viable research methodologies which have precluded real results in this area. The problem of methodology is at least fourfold:

- ISOLATION OF VARIABLES: "Obvious though it is, it must be stressed that the difficulty of isolating variables is the main and crucial problem."[4] Any evaluation must isolate the variables before attempting to manipulate and control them. Once this has been done, then the interactions among the variables must be plotted before results become meaningful.

  In experiments with animals and inanimate objects in controlled environments, it has been possible to isolate the variables, measure effects, and reintegrate them into useful results. Studying learners and learning is not so simple: there is the learner (and his home, his parents, his culture, and his disabilities), the others in the group (and their own unique sets of characteristics and interactions), the educational program (with its staff, materials, and time patterns) -- and, of course, the physical spaces within which it all takes place.

  Fortunately, the field of research methodology is beginning to develop some useful tools and techniques to handle these complex interactions.

- USE OF CONTROL GROUPS: There seems to be a general lack of agreement on the use of control groups in environmental research, particularly where exceptional children are involved. Should simultaneous experimentation be conducted with normal children and exceptional children? Should the research be done with normal children first to establish a frame of reference? Or should normal children not be considered at all?

- LOCATION OF THE EXPERIMENTATION: There are two general approaches here: The first is the "field evaluation" technique which leaves the experimental situation in its natural milieu. The attempt is to recognize that there are many variables interacting simultaneously and to evaluate as many of them as possible. The other approach is a "laboratory" technique which places the research in a specially controlled environment. The argument here is that this approach allows careful manipulation of individual variables, and that the removal of the children from their "regular" milieu can be compensated for.

o TECHNIQUES FOR MEASUREMENT: Finally, there is little agreement on the types of information gathering and measurement techniques which are most effective in environmental evaluation. The roles of interview, questionnaire, test, closed-circuit television, cameras, and sensing devices in this work have not been well-defined. An important task in environmental research will be the development of these and similar techniques for both field and laboratory measurement.

The field of environmental research is quite young and characteristically it exhibits the symptons of its youth. Current approaches ~~are~~ typically scatter-shot, taking place in many areas simultaneously and somewhat arbitrarily, with many methods of varying sophistication and with different degrees of relevance in content. As with any new field there is much searching to define the area of concern and the relationships with other disciplines, (notably psychology, sociology and physiology). Consequently, a good deal of exploration is now being done at the interfaces with other fields; for in defining these interfaces, the main body of concern will also be defined. As the field of environmental research matures, a more co-ordinated approach to research in the field will be developed.

Introducing the "Environmental Variable" into Education Research

While architects and their environmental design partners can make some inroads in basic environmental research, they cannot direct this effort to special education without help from the educators.

Many university departments of special education currently conduct programs of educational research and teacher training. Many of these schools also conduct program evaluations in the field. Current practice in many of these situations, however, excludes any real consideration of the environmental variable.

This is a situation which should be changed. As the educator-architect dialogue begins to reach the administrators of these programs, and as some basic environmental research begins to come to the surface, the environmental variable should be introduced into special education research at all levels

Some special educators have given some thought to this problem. Columbia University, for example, is about to erect a research and demonstration center for special education in New York City. They are now looking for ways to "design in" a flexible environment that can be manipulated as a variable in educational research. It can only be hoped that this possibility will be seriously explored in the research programs which will be undertaken in that facility.

Specialized Design Research

In addition to "basic" environmental studies in the fields of architecture and special education, it might well advance the state-of-the-art to undertake a number of rather specialized research studies, studies designed to look at various components of the special education environment in depth. Three such "specialized" areas are media, furniture and lighting.

1. Media: Audio-visual media are assuming an ever increasing role in the special education classroom. Children who have learning disabilities by and large have perceptual difficulties. Audio-visual media are effective teaching tools in these situations since learning stimuli are presented to the child through many means such as speech, graphics, motion pictures, music, etc. The child can more readily respond to stimuli in these forms.

A good deal of work has been done to develop audio-visual tools for special education. However, they are not being used to their full potential. The media tools are brought into the classroom unrelated to each other and unrelated to the total physical environment of the classroom. For the most part, they are used arbitrarily, if they are used at all.

Research must be undertaken to integrate audio-visual media into the physical design of the special education classroom. What form does this classroom assume both conceptually and physically in response to the media approach to special education? In what ways does this form interface with other requirements of the special education classroom? What are the priorities in resolving conflicts between competing requirements in this classroom? The answers to these questions and others are needed if we are to use the wealth of audio-visual media effectively.

2. Furniture: One of the potentially valuable educational tools is classroom furniture. This includes tables, chairs, desks, cubicles, screens, shelves, cabinets, and most importantly, those pieces which have not yet been invented. Early studies have demonstrated the efficacy of various seating arrangements in encouraging social interaction, collaboration on a task, or directing attention. The notion that one can learn from changing the physical environment has some support. To give children the opportunity to change their classroom is a valid goal. There is a demonstrated need in classrooms, especially so-called flexible ones, for furniture which can be used to define space.

This "new" look at furniture for the special education classroom should be taken from two viewpoints: that of the child and that of the teacher. The former uses the furniture every day, and the latter may choose to structure environment with it. The child can become very intimately involved with furniture, and it undoubtedly plays a large part in his perceptions of his surroundings. New kinds of furniture can be used to implement some of the environmental conceptualizations developed in Part 7: furniture that looks permanent and consistent, but which can be put together in different ways to articulate space.

3. Lighting: One of the most profound variables in environment is light. The influence of light on behavior is almost autonomic and not within our control. Because of this it can be a powerful tool in the hands of both architect and teacher if it is used sensitively.

Light can do many things in the special education environment. It can set a mood, direct attention, define space, aid in perceptual activity, and control emotions. Research in the field of lighting should focus on the qualities, intensities and colors of light necessary to encourage certain reactions and behavior. It should also concentrate on developing the technical means to provide and control light: What devices can be developed to artificially produce various types of light? How can natural light coming through windows not only be controlled but actually used to educational advantage? How can the teacher be provided with easy means to control these lights?

Case Study Evaluations of Special Education Environments

Another way of identifying problem areas and collecting some basic data and impressions is to environmentally "monitor" ongoing programs in special education. In this way, a research team of architects and educators could actually interact with ongoing programs on a continuing basis

As an example, the Board of Cooperative Educational Services in Northern Westchester County, New York is about to build a facility for several hundred mentally-retarded and emotionally-disturbed children with a completely open plan. This departure in facilities for special education should be carefully monitored by environmentally-oriented people from the day it opens: How is the space used? What kinds of subdivisions appear in time? How are the subdivisions changed to meet changing needs? What kinds of confined spaces do teachers and students create to "fight" open space? How is a consistent environment attained?

Answers to these questions may not yield concrete guidance which can simply be generalized for all special education situations. They can, however, go a long way to get the effort started

Case studies such as this are largely individual in scope, however -- only those actually involved benefit directly. This suggests that we should explore ways of developing case studies as integral parts of entire "programs" of projects whenever possible.

As an example, the 90th Congress passed the Handicapped Children's Early Assistance Act (PL 90-538) which supports model programs to aid handicapped children in their early years. Early childhood special education is nearly always environmentaly-oriented; the child learns to use his senses, to perceive, to become mobile and to use the physical artifacts of his environment. The emphasis is on concrete rather than abstract learning. For this reason, it would seem proper for the administrators of this program to "build in" an environmental component: some central research on surroundings for the young handicapped child, with funded case study approaches and evaluations in the field. It is symptomatic of the educator-architect dialogue breakdown that this component does not currently seem to be included in this program.

In addition to federal work, many states are now developing various "programs" for special education. Because state education offices inevitably wind up setting facilities planning guidelines for these programs, it is hoped that programs of environmental studies could be integrated into these educational planning and operating efforts

It is terribly difficult to approach the problem of exceptional children and their education in a dispassionate way. The problem is immense, and as one travels from school to school, and from program to program, one almost automatically "senses" that the physical environment influences these children. Any environmentally oriented person does not have to spend many hours with these children and their teachers before he becomes excited about the possibilities.

The authors of this paper sincerely hope that they have been able to lay enough groundwork to serve as a "take-off" point for some of the proposals above. When the Council on Exceptional Children winds up their "Physical Environment and Special Education" project later this year, another plateau will have been reached. What happens next is up to all of us.

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